

1992

# An empirical investigation into the construct redundancy of job evaluation and job redesign

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**Marchese, Marc C., Ph.D.**

**Iowa State University, 1992**

**U·M·I**

**300 N. Zeeb Rd.  
Ann Arbor, MI 48106**



**An empirical investigation into the construct  
redundancy of job evaluation and job redesign**

**by**

**Marc C. Marchese**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirements for the Degree of  
DOCTOR OF PHILOSOPHY**

**Major: Psychology**

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## ABSTRACT

This study addressed the question: To what extent is there convergence between job evaluation components that are associated with higher levels of pay and job design characteristics that are associated with higher levels of enrichment? Ten clerical jobs and ten professional/scientific jobs were the observational units for this investigation. Two professionally established job evaluation instruments and two widely accepted job characteristic inventories were used to assess levels of job worth and job design, respectively. Average salary was obtained for the twenty jobs. Results indicated that there was moderate convergence between job evaluation and job design. The degree of convergence between job worth and job design was much higher for clerical jobs than for professional/scientific jobs. Furthermore, the degree of convergence between job design and job evaluation was higher with the JDS than the JCI. Also, job pay was shown to be highly related to job design, especially in the clerical job family. The only job characteristic that was strongly and consistently related to the job evaluation factors and job pay was variety. The divergent results across job families provided evidence that job evaluation and job design are not redundant. The implications of these and other findings and suggestions for future research are discussed.

## INTRODUCTION

Two distinct areas of industrial/organizational psychology were investigated. One area is called job evaluation, while the other area is entitled job redesign or job enrichment. The former refers to a systematic evaluation of jobs within a given organization. The goal of job evaluation is to create internal equity of the pay structure within an organization. The latter focuses upon redesigning job or task characteristics (i.e., task identity, task significance, autonomy, skill variety) to make the worker more motivated, satisfied, and productive on the job. The area of job enrichment has received considerable attention in the literature, whereas the research on job evaluation is rather limited. This research posed the question, "To what extent is there convergence between the job evaluation factors that are associated with higher levels of pay and job design factors that are associated with high levels of enrichment?" Job evaluation procedures are critical in determining the wage structure within an organization. If there is a weak relationship ( $r < .25$ ) between job evaluation methods and job redesign measures, then that would imply that the psychological attributes widely revered in the literature have little correspondence to the objective properties that determine the worth of jobs. On the other hand, if there is a very strong relationship ( $r > .75$ ) between job evaluation

systems and job enrichment methods, then it would imply high construct redundancy between these two paradigmatic fields of study. Therefore, the intent of this study was to empirically examine these two conceptually distinct areas in industrial/organizational psychology to assess their relationship.

### Job Evaluation

The study of job evaluation increased in importance in industrial/organizational psychology as a result of the Equal Pay Act of 1963. The Equal Pay Act prohibited sex discrimination in pay. Employers cannot discriminate between men and women in the matter of pay where both are engaged in jobs that require equivalent skills, efforts, and responsibilities and that are performed under similar working conditions. All four criteria (skill, responsibility, effort, and working conditions) must be met in order for the Equal Pay Act to apply. The jobs do not necessarily have to be identical but only substantially equal for the Equal Pay Act to be applicable (Patten, 1988). Wage differentials can exist within an organization, but the differences must be based on bona fide occupational qualifications. Seniority systems and merit-pay systems are still appropriate as well, just as long as both men and women are treated equally (Patten, 1988).

Job evaluation systems existed prior to the Equal Pay Act of 1963. Adam Smith, the author of Wealth of Nations, discussed job evaluation in the 1790s. Job evaluation

originated in the form used today in the 1920s (Patten, 1988). In the 1940s the National War Labor Board (NWLB) advocated the implementation of job evaluation systems to create order out of the inequitable and disorganized job structures that existed at that time (Belcher, 1974). In the early 1940s the NWLB issued an order calling for salary adjustments to reduce the disparities in wages paid to males and females for comparable quality and quantity of work under similar conditions. From the 1940s to the present, job evaluation systems have been associated with a rising consciousness of sex-based pay discrimination, which culminated with the passage of the Equal Pay Act of 1963 to mandate equal pay for comparable work.

Conceptually, job evaluation systems purport to measure job worth. Positions of equal or comparable worth should have comparable pay associated with them. If one can accurately assess the levels of skill, responsibility, effort and working conditions required for each job, then an organization can create internal pay equity. Men and women will receive equal pay for comparable work. However in practice, job evaluation systems measure compensable factors (skills, responsibility, problem solving, etc.) of jobs to optimize the relationship between the wages assigned to each job by the job evaluation procedure and the wages that are associated to reflect market conditions (Schwab, 1984). Therefore, job evaluation

procedures do not singularly determine the compensation level of a job based solely on the degree of skill, effort, responsibility, and working conditions required by the job. The selection and weight of the compensable factors in any job evaluation procedure is a judgment, which may or may not reflect a systematic bias in our society (Muchinsky, 1990). Our society may place a higher value on those compensable factors typically associated with male-dominated occupations, which results in female-dominated occupations receiving considerably lower wages. Until a method is devised that objectively assesses the worth of a job, the issue of comparable worth may never be resolved. (For an in depth analysis of the issues in comparable worth see Patten, 1988 or Livernash, 1984.) Thus, job evaluation methods tend to be a systematic approach of appraising the value of each job in relation to other jobs in the organization (Patten, 1988; Muchinsky, 1990); but it is not an objective method for assessing the absolute worth of a given job.

There are two basic perspectives regarding the role of job evaluation for making assessments of relative job worth (Schwab, 1985). These two perspectives are labelled the institutional view and the applied measurement view. According to Schwab (1985), the institutional perspective originated from the research and thinking of institutional economists (Kerr & Fisher, 1950; Livernash, 1957). This

perspective views job evaluation as a method to work out disagreements about pay differentials that arise over time. The conflicts come about as a result of the differences between the organization's internal wage structure and market conditions. The main task of job evaluation is to align the internal wage structure with the market conditions.

The applied measurement view does not perceive job evaluation as a flexible yardstick that continually adjusts to changes in the market. The purpose of the applied measurement view is to generate scores on compensable factors (Collins & Muchinsky, 1990). The job evaluation results should remain relatively constant unless the content of the job is redesigned. The vast majority of research and methods in applied psychology adopts an applied measurement view of job evaluation.

Since the passage of the Equal Pay Act of 1963 numerous job evaluation techniques have been developed. The foundation of many of these methods is the four classic job evaluation factors or criteria: skill, responsibility, effort, and working conditions. The differences in the various methods of job evaluation rest primarily on the number and degree of specificity of the compensable factors. The key to any job evaluation method being successful is whether or not the relevant factors are being considered (Muchinsky, 1990). Unfortunately, there is very little research comparing the

reliability, validity, and equivalence of the various methods (Milkovich & Cogill, 1984). A recent study by Collins and Muchinsky (1990) investigated three job evaluation methods. They found high interrater agreement across the three job evaluation methods, high convergent validity for the four job evaluation factors, and high discriminant validity between job classification systems. These findings are quite promising, but more work needs to be done in assessing the equivalence of job evaluation methods.

#### Types of Job Evaluation Methods

There are many kinds of job evaluations techniques. The vast majority of job evaluation methods can be classified in one of the following categories: ranking method, classification method, market-pricing, policy-capturing approach, factor comparison method, or point-factor plan.

The ranking method is the oldest job evaluation method (Patten, 1988). During World War I, Walter Dill Scott developed a rating scale. Scott's rating scale evaluated officers in the army on a variety of attributes: appearance, influence over men, experience, vigor, stability, etc. Based upon the ratings on these attributes the officers were ranked in order of ability (Ferguson, 1963). After the war, the concept of ranking was carried over into ranking jobs in private industry and used in both performance appraisal and job evaluation (Patten, 1988). The ranking method is



applicable to many small organizations or to rank jobs functionally in middle to top management positions. The ranking method becomes quite cumbersome when there are over 20 jobs to rank.

The classification method collapses jobs into labor grades. Its main improvement over the ranking method is that guidance is made available by carefully worded grade-descriptor language. This approach was used by the federal government in the 1830s for classifying clerks (Patten, 1988). As the classification system of job evaluation progressed in the federal sector, it became the responsibility of the U.S. Civil Service Commission (now the Office of Personnel Management) to establish standards for jobs. The most widely used classification method is the General Schedule (GS). Over two million government employees are classified into one of eighteen possible job grades according to the GS. According to Patten (1988), the greatest strength of job evaluation systems lies not in their claims of scientific accuracy, but in the fact that they require management to describe and classify positions and to examine the interrelationships among jobs to correct anomalies. The classification method attempts to meet these objectives.

The market-pricing approach to job evaluation represents the institutional perspective on job evaluation. To conduct a market-pricing approach an employer collects wage survey data

of similar jobs in the labor market as a means of comparison (Collins, 1989). This approach to job evaluation is not practical for maintaining internal equity. The content or requirements of the job are not considered in this job evaluation system, which violates the Equal Pay Act of 1963.

The policy-capturing approach to job evaluation is similar to the market pricing approach. This method calculates the degree of association between job content components and external wage rates to create a wage structure of jobs. The multiple regression paradigm is implemented to calculate the correlations between job factors and value points to these factors based upon market wages. As Collins (1989) points out "since market wages influence wage and salary administration, these external factors must be considered along with the content of the job." The Equal Pay Act does not acknowledge the influence of the external market on wages to establish comparable work.

The factor comparison method is a modification and elaboration of the rating scale devised by Scott during World War I. This approach focuses evaluation on certain key or benchmark jobs that are used as anchor points to base the entire job structure. The first step in this approach is to identify the key jobs (approximately 20). The key jobs are those that are clearly defined across organizations and the wages associated with these jobs are usually stable and well

known. Therefore, this approach is also affected by market conditions. The key jobs are ranked directly on common factors such as: mental requirements, skill requirements, physical requirements, responsibility, and working conditions (Benge, Burk, & Hay, 1941; Benge, 1984). The final result is the identification of a small number of benchmark jobs ranging from the highest wage to the lowest wage (Patten, 1988). All of the other jobs in the organization are grouped into clusters around the key job that is most similar. Then the jobs in each cluster are ranked by a panel of experts, usually consisting of employees in personnel management (Collins, 1989), on the evaluation criteria. Wages are then assigned using the key job in that cluster as an anchoring point.

The final type of job evaluation system is the point system. It is the most widely used approach of job evaluation (Collins, 1989). In the point system jobs are broken down into their compensable factors. Typically, the number of factors in a given point system of job evaluation ranges from 10 to about 20. Research has consistently demonstrated that these factors can be reduced (by using factor analysis or stepwise multiple regression procedures or both) to only a few factors (e.g., Davis & Tiffin, 1950; Lawshe, 1945; Lawshe & Maleski, 1946). Nonetheless, modern point systems of job evaluation still contain approximately 15 factors. For each factor there is a scale defined by a number of levels, usually

3 to 7. Each level for the factors has an associated point value. Then, all of the jobs are rated on the factors. A point score for the job is the sum of all the factor scores (Doverspike, Carlisi, Barrett, & Alexander, 1983). In most point systems of job evaluation the skill factor receives the most weight, while responsibility is typically second (Livernash, 1984). Patten (1988) estimated that 50% of the weight in a job evaluation program goes to skill and 35% to responsibility. In blue-collar jobs, effort and working conditions are given additional weight. The weights assigned to the compensable factors are based on the values of the job evaluator, which may be influenced indirectly by market conditions. The last phase of a point system approach to job evaluation is the assignment of wage rates to the jobs based on the job evaluation results and usually other personnel and organizational factors, including market conditions (Doverspike et al., 1983).

Overall, the point system approach is the most widely accepted and used method of job evaluation, because it breaks jobs down into their component parts and they assess the factors mandated by the Equal Pay Act of 1963. Factor comparison methods are the least popular because they are very time consuming and cumbersome, while state and local governments traditionally rely on classification methods or ranking methods for job evaluation (Collins, 1989).

There are new methods of job evaluation that have been developed. The major weakness of the point system of job evaluation is that the same set of compensable factors, along with the weights associated with them, are usually not appropriate for all jobs within a given organization. Therefore, it is common to find multiple job evaluation methods within the same organization. When more than one job evaluation method is used within an organization, it makes it almost impossible to directly compare jobs that were evaluated under different systems (Collins, 1989). The newer methods have attempted to find one or two compensable factors that can be applied to all levels of jobs and evaluate all jobs along this dimension(s) (Patten, 1988). For example, Jaques (1972) used "time span of discretion" as the sole compensable factor. Time span of discretion (TSD) is the amount of time it would take before inadequate job performance becomes evident. Jobs with longer TSD are viewed as being more critical to the organization than are those with shorter TSD. Charles (1971) isolated functions of coordinating, organizing, and planning as the crucial compensable factors, but this approach was inappropriate for organizations with production jobs. Also, Paterson and Husband (1970) attempted to use decision-making as the only compensable factor. Patten (1988) criticized the newer methods because they lack applicability. Jobs are too

complex too be explained by the use of only one or two dimensions.

Regardless of the method of job evaluation that is chosen, there are still several issues that need to be resolved. The literature on the reliability of job evaluation methods is rather mixed. Schwab (1985) indicated that unreliability in the evaluation of specific compensable factors is a serious problem. However, Doverspike et al. (1983) did find very impressive reliability coefficients for total scores (.97 & .99) for a point-method system using ten raters and using one rater, respectively. Both alternatives revealed highly consistent findings. Also, recent research by Hahn and Dipboye (1988) has indicated that training can greatly increase the reliability of job evaluation results. Their findings revealed reliabilities in the .70s and .80s as the norm by training job evaluators. Furthermore, research by Fraser, Cronshaw, and Alexander (1984) and by Collins and Muchinsky (1990) have revealed high inter-rater reliabilities for job evaluation methods.

One possible explanation for the lack of agreement on the reliability in job evaluation methods could be the fact that many compensable factors are vaguely defined (Patten, 1988). Also, the number of compensable factors varies across job evaluation methods, as previously mentioned. Unfortunately, many compensable factors are chosen because they are thought

to be relevant, but they do not have any connection with skill, responsibility, effort, or working conditions. At this time, there is not a uniform set of compensable factors (Muchinsky, 1990).

The most substantial issue pertaining to job evaluation is the inability to identify an acceptable criterion of job worth. Typically, job evaluation is validated against some sort of wage criterion (Schwab, 1984). This criterion is contaminated for two reasons. One is that many job evaluation methods use wage rates in the evaluation, thereby artificially inflating the agreement between the two measures. Second, the importance of job evaluation increased as a result of the comparable worth movement. If wage distributions are biased against jobs held traditionally by women and if wages are used as the criterion in job evaluation, then that bias will be reflected in the job evaluation results. Research by Schwab and Wichern (1983) demonstrated that systematic bias against female key jobs has the generally hypothesized negative impact on predictions for female non-key jobs. However, they also found that systematic evaluation bias of female-concentrated occupations does not necessarily serve to the wage disadvantage of all female jobs. Thus, the adequacy of wage distributions as the criterion for job evaluation systems is questionable. The purpose of the Equal Pay Act of 1963 will not be achieved if wages are used as the criterion of job

evaluation accuracy. The search for an acceptable criterion of job worth continues.

### Summary

In conclusion, job evaluation is a process of systematically establishing a structure of jobs within an organization based upon a methodical consideration of job content and requirements (Collins, 1989). Job evaluation is necessary to create and maintain internal equity for an organization. The greatest strength of job evaluation is that it forces organizations to define the jobs within the organization and to rationalize the wage structure. The main weaknesses of job evaluation are: the lack of research in this area, inadequate reliability in many job evaluation methods, the difficulties and disagreements over compensable factors, and the lack of an acceptable criterion to judge the accuracy of job evaluation methods.

### Job Redesign

The importance of job design dates back to the industrial revolution. The principles of scientific management proposed that through the design of work, organizations can maximize the productivity of their employees, while minimizing training costs and labor expenses. Critics of scientific management asserted that low-skill level, repetitious, and segmental jobs produced by the application of scientific management principles will result in job dissatisfaction, increased



turnover and absenteeism, and other dysfunctional consequences (Aldag, Barr, & Brief, 1981). The human relations movement that followed stressed the need to improve simultaneously "concern for people" and "concern for production" (Steers & Mowday, 1977). Many individuals see job enrichment or job redesign as the solution to increase organizational productivity while decreasing employee alienation (Hackman & Oldham, 1975; Sims, Szilagyi, & Keller, 1976; Steers & Mowday, 1977).

Research in the area of job redesign has investigated the relationships between perceived job characteristics and a variety of job outcomes. The primary research emphasis has been on the relationship between job characteristics and incumbents' satisfaction and performance, but some studies have examined the impact of perceived job characteristics on motivation, attendance, turnover, job involvement, role stress, expectancy perceptions, alienation, and many other variables (cf. Steers & Mowday, 1977; Hackman & Oldham, 1980; Aldag, Barr, & Brief, 1981).

The area of job redesign or job enrichment is founded in the work of Turner and Lawrence (1965). They created the Requisite Task Attributes Model, which was the basis for most theories of job enrichment. This model identified certain task characteristics that led to higher levels of job satisfaction and attendance on the job. These key

characteristics were: variety, autonomy, responsibility, knowledge and skill, optimal interaction, and required interaction. The effectiveness of these job characteristics to influence job satisfaction and attendance was moderated by the employees background (rural or urban) and situational factors (i.e., satisfaction with coworkers, satisfaction with supervision) (Turner & Lawrence, 1965). The empirical evidence on the Requisite Task Attribute Model was not conclusive that the six job attributes selected were the most salient in terms of satisfaction and attendance (Steers & Mowday, 1977).

The most widely accepted theory of job enrichment is the Job Characteristics Model by Hackman and Oldham (1975). This model is based largely on the Requisite Task Attribute Model. The Job Characteristics Model isolates five core job dimensions: skill variety, task identity, task significance, autonomy, and feedback. Hackman and Oldham (1975) define these job characteristics as follows:

*Skill Variety.* The degree to which a job requires a variety of different activities in carrying out the work, which involve the use of a number of different skills and talents of the employee.

*Task Identity.* The degree to which the job requires completion of a "whole" and identifiable piece of work-

that is, doing a job from beginning to end with a visible outcome.

*Task Significance.* The degree to which the job has a substantial impact on the lives or work of other people—whether in the immediate organization or in the external environment.

*Autonomy.* The degree to which the job provides substantial freedom, independence, and discretion to the employee in scheduling the work and in determining the procedures to be used in carrying it out.

*Feedback from the job itself.* The degree to which carrying out the work activities required by the job results in the employee obtaining direct and clear information about the effectiveness of his or her performance. (pp. 161-162)

The perceptions of these job characteristics influence employee attitudes and motivation. The focus of the theory is on the relationships between perceived, not objective, job characteristics and affective, not behavioral, responses to job perceptions (Taber & Taylor, 1990). The strength of the relationship between perceived job characteristics and affective responses is moderated by two sources: individual differences, and the social comparison processes. Individual differences such as protestant work ethic (Lawler, Hackman, & Kaufman, 1973), higher growth need strength (Hackman & Oldham,

1975), self-actualization need strength, and locus of control (Sims & Szilagyi, 1976) have been shown to moderate incumbents' affective responses to their perceived job characteristics. Social comparison research by Oldham and Miller (1979) and Oldham, Nottenburg, Kassner, Ferris, Fedor, and Masters (1982) revealed that workers compare their job characteristics to those of their coworkers in order to interpret the meaning of their jobs. Thus, as Taber and Taylor (1990) point out "satisfaction with the job is affected not only by the perceived characteristics of the job, but also by whether the characteristics are evaluated to be greater or less than those of comparison workers" (p 471).

There are two main instruments used to assess job characteristics. One is titled the Job Diagnostic Survey (JDS) developed by Hackman and Oldham (1975) to directly test the Job Characteristics Model. The other job design measure is the Job Characteristic Inventory (JCI) constructed by Sims, Szilagyi, and Keller (1976).

#### The Job Diagnostic Survey

The JDS is the most widely used measure of job design since the inception of the Job Characteristics Model in 1975 (Pierce & Dunham, 1978a; Taber & Taylor, 1990). Hackman and Oldham (1975) created the JDS with the intention to diagnose existing jobs to determine if (and how) they might be redesigned to improve employee motivation and productivity,

and to evaluate the effects of job changes on employees' attitudes.

The JDS is a direct product of the Job Characteristics Model (Hackman & Oldham, 1975). The Job Characteristics Model indicates that five core job dimensions influence three critical psychological states (experienced meaningfulness of work, experienced responsibility for outcomes of the work, and knowledge of the actual results of the work activities). These psychological states in turn impact various personal and work outcomes (work motivation, performance, job satisfaction, absenteeism, & turnover). The JDS assesses employees' perceptions of the five job dimensions: skill variety, task identity, task significance, autonomy, and feedback. A summary score reflecting the overall "motivating potential" of a job, in terms of the core job dimensions, can be calculated. This summary index is called a motivating potential score (MPS). A job high or low in motivating potential will not affect all individuals equally. According to Hackman and Oldham (1975), an individual's desire for growth and accomplishment (called growth need strength) will moderate the relationship between the motivating potential of the job and the employee's reactions to that job.

In the original study by Hackman and Oldham (1975) the internal consistency reliabilities for the five job dimensions ranged from .59 (task identity) to .71 (skill variety).

Internal consistency reliabilities for the other JDS scales ranged from .56 (social satisfaction) to .88 (growth need strength) with a median correlation of .76. As an index of discriminant validity Hackman and Oldham (1975) provided median off-diagonal correlations. The off-diagonal correlations ranged from .12 (task identity) to .28 (growth satisfaction), with a median off-diagonal correlation of .19. The independence of the five core dimensions was determined by the intercorrelations among the dimensions. They found moderately positive correlations across the five dimensions (range .16 to .51, median=.26). Hackman and Oldham (1975) expected nonorthogonal dimensions because they assumed that "good" jobs are good in a number of ways and "bad" jobs are bad in a number of ways. They stated that "there is no a priori reason to expect that the job dimensions would or should be completely independent, and the moderate level of intercorrelation among them does not detract from their usefulness as separate job dimensions" (p. 166).

A recent meta-analysis by Taber and Taylor (1990) revealed that the JDS has several psychometric limitations, but is able, when used properly, to provide useful information about perceived job properties. Five studies provided test-retest reliability coefficients for the JDS. The frequency-weighted correlations across the studies and across the core dimensions ranged from .47 (task significance) to .69

(variety) with a median weighted test-retest correlation of .59 (feedback). Twenty-one studies provided internal consistency data on the JDS. Internal consistency reliabilities for the JDS ranged from .65 (task significance) to .71 (task variety) with a median correlation of .69 (autonomy). Thirty studies conducted exploratory factor analyses of the JDS: two studies discovered two factors, six studies revealed three factors, nine studies suggested four factors, twelve studies discovered five factors, and one study revealed six factors on the JDS. Obviously, the results were mixed. According to Taber and Taylor (1990), little evidence exists to show that the JDS scales comprehensively span the range of conceptual categories that workers actually use when thinking about their job. Other results of the review by Taber and Taylor (1990) indicated that the five core JDS dimensions show moderately good discrimination from one another. Furthermore, several studies have shown that changes in objective task characteristics cause significant changes in JDS scores. Lastly, the reviews of the substantive validity of the JDS are inconclusive. Some research has indicated strong relationships between the perceived job characteristics and affective outcomes (Fried & Ferris, 1987), while other research has found this relationship to be questionable (Aldag et al., 1981).

In conclusion, the JDS appears to have limited test-retest reliability (median=.59), marginally acceptable internal consistency reliability (median=.65), moderate discrimination across the five core attributes, and mixed substantive validity evidence. It seems that the popularity of the JDS is not equivalent to its psychometric properties. Nevertheless, the JDS is used quite frequently and can be useful in analyzing job characteristics.

#### The Job Characteristic Inventory

The second most frequently used job characteristics inventory is the JCI developed by Sims, Szilagyi, and Keller (1976). The JCI was constructed using factor analytic techniques that resulted in six factors: variety, autonomy, feedback, task identity, dealing with others and friendship. The first four JCI scales have comparable titles to the JDS scales. The feedback items, however, on the JCI appear to examine feedback as the amount of information received from coworkers or supervisors, rather than feedback from the job itself (JDS perspective). Past research has not investigated this difference.

Internal consistency reliabilities for the six task characteristics of the JCI were very close, ranging from .74 (autonomy) to .80 (variety) except for the friendship scale which had an internal consistency reliability of .62. Convergent and discriminant validity evidence was demonstrated



for the four job characteristic variables (variety, autonomy, feedback, and task identity) that are in common with the JDS. Moreover, multiple discriminant analysis indicated that the job characteristics can discriminate between occupational groups (Sims, Szilagyi, & Keller, 1976), which contributed further evidence of the validity of the JCI.

The number of studies investigating the psychometric properties of the JCI is rather limited compared to the vast literature base on the JDS. Reliability of the JCI has been investigated in a handful of studies (Keller, Szilagyi, & Holland, 1976; Kidron, 1977; Keller, Szilagyi, & Holland, 1977; Sims, 1977; Pierce & Dunham, 1978a; Pierce & Dunham, 1978b; Brief & Aldag, 1978). The mean internal consistency reliability across these studies is .81, ranging from a low of .43 for dealing with others (Brief & Aldag, 1978) to a high of .93 for variety and autonomy (Keller et al., 1976). Only one study investigated the test-retest of the JCI. Sims (1977) found a mean subscale test-retest reliability of .73, with a six month interval between measurements.

The convergent and discriminant validity of the JCI was investigated in only three studies, not including the original study by Sims, Szilagyi, and Keller (1976). Pierce and Dunham (1978a, 1978b) reported convergent validity across the task attributes between incumbents' ratings, using the JCI and the JDS. The mean correlation across these studies was .70.

Pierce and Dunham (1978a) also reported convergence between the JCI and measures of technology. Discriminant validity evidence was presented in the original article by Sims, Szilagyi, and Keller (1976). Pierce and Dunham (1978a, 1978b) and Brief and Aldag (1978) reported sufficient discriminant validity between the task attributes. The mean intercorrelation between the task attributes across these studies was .32, with a low of .11 between autonomy and variety (Brief & Aldag, 1978) to a high of .55 between task identity and autonomy (Brief & Aldag, 1978).

There has been substantial validity evidence on the JCI reported in the literature. Sims and Szilagyi (1976) reported significant correlations ( $r=.23$ ,  $p<.01$ ) between the task attributes and satisfaction with work, pay, promotion, supervision and coworkers. They also noted that the six task dimensions were significantly correlated ( $r=.17$ ,  $p<.01$ ) with supervisors' job performance ratings. Keller, Szilagyi, and Holland (1977) provided additional evidence that the task attributes on the JCI are significantly positively related to satisfaction with supervision, promotion, and coworkers. Lastly, Brief and Aldag (1978) found that each of the task attributes as rated by job incumbents showed a significant correlation ( $r=.30$ ,  $p<.01$ ) with job satisfaction.

The JCI dimensions were originally created through use of factor analysis (Sims et al., 1976). Research by Sims (1977),

Pierce and Dunham (1978b), and Brief and Aldag (1978) reported factor structures consistent with the findings of Sims et al. (1976). It seems that the JCI task dimensions are well defined.

In conclusion, the JCI does appear to have satisfactory internal consistency reliability and moderate test-retest reliability (although only one study has examined the test-retest reliability of the JCI). The task dimensions of the JCI appear to be well defined. There is, however, limited validity evidence for the JCI. The task attributes do appear to be positively related to one another. Furthermore, the JCI dimensions seem to be positively related to various aspects of job satisfaction. More research examining the psychometric properties of the JCI is still needed.

There are two studies in particular that investigated the relationship between the JDS and the JCI. The first comparison between these two measures of job characteristics was conducted by Pierce and Dunham (1978a). Their data were collected from 155 employees in a multiple-line insurance company. They examined only the overlapping dimensions (feedback, variety, autonomy, and task identity) of the two instruments. Their findings indicated that the internal consistency reliabilities of the JCI dimensions were all higher than the JDS dimensions. The internal consistency reliabilities for the JCI ranged from .85 (autonomy) to .90

(feedback), while the internal consistencies for the JDS ranged from .69 (feedback) to .79 (autonomy). Correlations between equivalent scales were also computed. There was a moderate to high degree of convergence between the two measures that ranged from .65 (feedback) to .74 (task identity). Factor analysis was used in order to determine the distinctiveness of the scales. A four-factor oblimax rotation failed to produce a clean definition of the four a priori JDS scales. The only factor that matched for the JDS was task identity. The complete eigenvalue pattern suggests at most a three-factor solution for the JDS, but Pierce and Dunham (1978a) concluded that, "It appears, however, that a single-factor solution would be the most parsimonious representation" (p. 126). The four factor oblique rotation confirmed the four a priori dimensions of the JCI. The complete eigenvalue pattern clearly suggests a four-factor solution as the most appropriate. On the basis of these results, they concluded that the JCI is superior to the JDS in terms of reliability and empirical dimensionality. Nonetheless, the utility of the JDS in job design research has been clearly demonstrated. Therefore, they suggest that, "the optimal approach for job design researchers focusing on perceived job characteristics would be the use of multiple methods" (p. 128).

The other study that explored the relationship between the JDS and the JCI was conducted by Aldag, Barr, and Brief

(1981). This article was a review of the literature on both of these two instruments since their inception in 1976. They evaluated the JDS and the JCI on six criteria: internal consistency reliability, test-retest reliability, convergent validity, discriminant validity, dimensionality, and substantive validity. Based upon past research, they concluded that the internal consistency reliability of both instruments is acceptable. Test-retest reliability of the two instruments is relatively unknown, because only a few studies have assessed this form of reliability. In concordance with the work by Pierce and Dunham (1978a), Aldag et al. (1981) concluded that the convergent validity of the two measures is acceptable. However, the discriminant validity and the dimensionality of the JDS is considered unacceptable due to repeated findings of high intercorrelations among the JDS scales and the failure to confirm the a priori factor structure of the JDS. The discriminant validity of the JCI is considered questionable due to consistent positive correlations among the JCI scales. Aldag et al. (1981) state that the dimensionality of the JCI is also questionable even though all research has indicated that the task dimensions of the JCI appear to be well defined. Lastly, the issue of substantive validity was divided into two categories. One category was substantive validity evidence using affective criteria (e.g., job satisfaction, satisfaction with

supervision), while the other category was substantive validity evidence using behavioral criteria (e.g. absenteeism, turnover). Studies using affective criteria and perceived job characteristics have consistently yielded positive results for both instruments. However, the substantive validity evidence with behavioral criteria are considered by Aldag et al. (1981) to be unacceptable for both instruments. Mixed results for both instruments have been reported in regards to behavioral criteria. More research into this area needs to be done. Overall, Aldag et al. (1981) consider the JDS and the JCI to be similar in terms of psychometric properties.

#### Summary

In summary, the JDS and the JCI are the most popular instruments to measure job characteristics. Their psychometric properties are somewhat similar and unfortunately not overly impressive. More research on these two measures is needed. It has been recommended that in order to study job design adequately both instruments should be used (Pierce & Dunham, 1978a). This research has incorporate both instruments to study job design.

#### Past Research Integrating Job Evaluation and Job Redesign

There have been a handful of studies that have examined the relationship between job characteristics and job evaluation. One of the first studies integrating these two areas was conducted by Dunham (1977). Dunham (1977) used the

JDS to assess perceived job design characteristics and used the Position Analysis Questionnaire (PAQ) to calculate job evaluation estimates. The PAQ is a widely used, standardized, structured job analysis questionnaire that consists of 194 job elements. The PAQ was not originally intended to be a job evaluation instrument, but McCormick, Jeanneret, and Mecham (1972) developed a job evaluation equation based upon nine of the PAQ dimensions. This equation predicts actual compensation rates for hundreds of widely different jobs. Application of the PAQ as a job evaluation instrument is an example of the policy-capturing approach to job evaluation. Job evaluation points (analogous to 1968-1969 U.S. dollars) and perceived job characteristics were collected for 256 employees of a large pharmaceutical plant.

Results indicated a correlation of .40 ( $p < .01$ ) between job evaluation points and perceived job design characteristics (a composite of the 5 JDS scales). Therefore, the "value" of the job is moderately related to the perceived job design characteristics. It is interesting to note that the correlation between job evaluation points and pay was only .34, and that the correlation between perceived job characteristics and pay was only .05. Thus, the PAQ job evaluation equation could account for only 11.6% of the variance in pay and that perceived levels of variety, autonomy, task identity, task significance, and feedback have

virtually no relationship with the pay of the job. Since job evaluation is used in part to determine pay, the appropriateness of the PAQ as a job evaluation instrument appears to be questionable.

A second study that examined the relationship between job characteristics and job evaluation was conducted by Rousseau (1982). In this article perceived job characteristics were assessed by a scale, constructed solely for the purposes of that study, that contained three JDS dimensions (autonomy, variety, and task significance) and two additional dimensions (role conflict and role ambiguity). The occupations in this study were evaluated using another job analysis instrument, the Functional Job Analysis (FJA) technique. The FJA characterizes jobs according to the complexity of skills that job incumbents use in dealing with data, people, and things (DPT). Based upon a longitudinal study of changes in DPT skills in the 20th century, Rousseau (1982) suggested that people are moving into jobs requiring higher levels of skills involving data and people and away from those jobs centered on skills involving things. This shift in skill requirements will most likely change the amount of variety, autonomy, or task significance workers experience. Therefore, it is important to investigate the relationships between perceived job characteristics and job requirements.



The results of this study indicated moderate significant ( $p < .01$ ) positive correlations between data skills and the three perceived job characteristics dimensions similar to the JDS and the JCI (autonomy, variety, and task significance). The correlations ranged from .31 (task significance) to .52 (variety). Correlations between these three task dimensions and people skills were somewhat lower. They ranged from .28 (autonomy and significance) to .34 (variety). However, the correlations between skills requiring working with things and the job characteristics were very low, ranging from  $-.11$  (task significance) to  $-.06$  (variety). Role conflict and role ambiguity had virtually no relationship among the DPT skills. The findings of this study suggest that dealing with data and to a lesser extent dealing with people may have a significant impact on an employee's work experience. Incumbents dealing with inanimate objects such as equipment and tools may contribute little to an individual's job perceptions (Rousseau, 1982). The main limitation of this article, in the context of the present investigation, is that Rousseau did not use a job evaluation instrument and did not use an established job characteristics inventory. Albeit, the article did show the relationships between certain job skills and perceptions of job characteristics.

Taber, Beehr, and Walsh (1985) investigated the convergence between a job evaluation system and job

characteristic measure. The job evaluation plan that they used was a version of the standardized point plan by the National Electrical Manufacturing Association (NEMA). It is a widely used job evaluation system in the manufacturing sector. Taber et al. (1985) created their own measure of perceived job characteristics based upon variants of the Yale Job Inventory and the Michigan Organizational Assessment Package. The subjects in this study were 308 incumbents of a large midwestern manufacturing company representing 90 different jobs ranging from unskilled laborers to skilled craftsmen. The subjects were randomly assigned to two groups for cross validation purposes.

The results of the Taber et al. (1985) study revealed a canonical correlation of .71 ( $p < .001$ ) between the job evaluation measure and the job characteristic assessment for the developmental sample. The canonical correlation dropped to .41 ( $p < .001$ ) for the holdout sample. The authors attribute this substantial shrinkage to the high degree of multicollinearity within both the job evaluation measures and job characteristic indices. Bivariate correlations between experience, judgment/initiative, and training/knowledge job evaluation ratings and self-rated job characteristics show numerous moderate positive relationships. Job evaluation ratings of working conditions revealed little association with perceived job characteristics. Taber et al. (1985) concluded

that although the canonical correlation was significant, it accounted for very little of the total redundancy in either set of measures. They feel that their results provide conservative estimates of the size and number of associations between psychological task attributes and more objective properties of jobs. They recommended that future studies in this area should use multiple and empirically established measures of job characteristics, such as the JDS and JCI.

The next study that looked into the relationship between job redesign and the objective properties of the job was conducted by Campion (1989). In this study two samples were used: a low-technology company and a high-technology company. Campion utilized the Multimethod Job Design Questionnaire (MJDQ) to assess job design characteristics. The MJDQ investigates job characteristics in relation to four different theories of job design. The motivational scale on the MJDQ is the most similar to the traditional approaches of studying job design. DOT codes were used to evaluate the ability requirements of the various occupations across the samples. Moderate to low correlations were found between job ability requirements and job design attributes. Based upon these findings, Campion concluded that the relationship between job redesign and job ability requirements could have staffing, training, and compensation implications.

The next study that examined the relationship between job redesign and job evaluation was conducted by Campion and Berger (1990). Similar to the previous study, two samples were used in this investigation. The second sample was broken down into exempt and nonexempt jobs, while the first sample was exclusively nonexempt jobs. For both studies job design was assessed using the MJDQ. Job evaluation points in sample one were assessed by average wage rates to ascertain the relationship between external market wages and job design. In the sample two results from a point job evaluation system were made available.

Results of this investigation indicated a very strong relationship ( $R=.69$ ,  $p<.05$ ) between pay and the job design measure for sample one. For the nonexempt jobs in sample two the findings indicate a very high correlation between the job evaluation factors and the job design measure ( $R=.83$  for complexity factor,  $R=.78$  for physical factor, both  $p<.05$ ). For the exempt jobs in sample two the results were similar ( $R=.78$  for managerial factor,  $R=.44$  for technical factor, both  $p<.05$ ). On the basis of these findings Campion and Berger concluded that job design and job evaluation are significantly related by means of the number and level of skills jobs required and by the degree of physically aversive or hazardous working conditions present on the job.

The most recent study that investigated the relationship between job redesign and job evaluation was conducted by Campion and McClelland (1991). In this study, they examined the effects of job enlargement on the compensable factors (skill, effort, responsibility, and working conditions) for 11 clerical jobs. The MJDQ was used to assess the impact of job enrichment. However, the method employed to ascertain the compensable factors was not identified. The results of the study indicated a correlation of .83 ( $p < .05$ ) between the motivational scale on the MJDQ and the compensable factors.

In summary, there have been six studies that examined the relationship between job evaluation and job redesign. None of the six studies used multiple measures of job evaluation or job design. Also, none of the studies used an established job evaluation method and one of two most empirically tested job characteristics inventories (JDS or JCI). Research using multiple and established methods of job evaluation and job design is required to advance our understanding of the relationship between these two distinct topics in industrial/organizational psychology.

#### The Present Study

The present study had four objectives. The first objective was to provide additional information on the similarity of different job evaluation methods. Past research (Milkovich & Cogill, 1984; Schwab, 1985; Collins & Muchinsky,

1990) has indicated that there are numerous methods of job evaluation, but there is limited information on the equivalence of these various approaches. The present study examined the relationship between two commonly used job evaluation procedures.

The second objective of this research was to provide additional information on the two most professionally established job characteristic instruments, the JDS and the JCI. Only one study (Pierce & Dunham, 1978a) administered the JDS and the JCI to the same subjects. The only other study to compare the JDS and the JCI was the literature review by Aldag et al. (1981). More research on the congruence of these two widely implemented job characteristics inventories is needed. The present study administered both measures to the same group of subjects and analyzed this relationship. Furthermore, only four studies have investigated the convergent and discriminant validity of the JCI (Sims et al., 1976; Pierce & Dunham, 1978a; Pierce & Dunham, 1978b; Brief & Aldag, 1978). The current research examined the convergent and discriminant validity of the JCI.

The main objective of the present study was to examine the relationship between job evaluation and job redesign. There are many reasons why it is important to examine the relationship between job evaluation and job enrichment. One reason for studying this relationship was stated very cogently

by Dunham (1977). He indicated that it is obvious to most personnel administrators that if the job has been redesigned then staffing requirements have also changed. Redesigning a job can impact the skills, responsibilities, efforts, and possibly working conditions that are necessary to perform the job satisfactorily. Any procedure that affects these job evaluation factors should impact the "worth", or at least the relative worth, of a given job within an organization. These changes, in turn, could have staffing and compensation implications. It seems that there should be a relationship between these two indices. Thus, this study may be very beneficial to industrial/organizational psychologists employed in industry dealing with job enrichment programs.

Similarly, at the organizational level this study could have important implications. Campion and Berger (1990) recently pointed out that job redesign and compensation are two critical parameters of the human resource system. Both can be perceived in two ways: first, as rewards offered by the organization to induce individuals to join and remain with the organization and, second, as methods of increasing employee effectiveness and satisfaction with the important aspects of their jobs. Both of these activities require substantial investment of the company's financial resources and commitment to managerial effort. Little attention has been directed

towards an understanding how these two activities interrelate.

Thus, Campion and Berger (1990) state:

Establishing these relationships is important in order to understand the compensation implications of designing jobs in new organizations, or redesigning jobs due to technological innovation, growth or retrenchment, reorganization, quality of work life programs, or product market demand. (p. 526)

Therefore, this study has important implications at the organizational level as well.

Another reason why the present study was important is at a purely theoretical level. Job evaluation systems are intended to distribute extrinsic rewards consistent with the skills, responsibilities, effort, and working conditions associated with job. On the other hand, the primary intention of social science job characteristics measures, such as the JDS and JCI, is to measure job attributes that affect intrinsic motivation and satisfaction (Taber et al., 1985). Over the years researchers have developed a plethora of psychological task attributes that have shown significant, but generally small relationships with affective and behavioral outcomes (e.g., Aldag, Barr, & Brief, 1981). These findings have led some researchers to conclude that current job characteristic indices are not measures of environmental realities, but are merely socially constructed perceptions, or



attributions of implicit theories of individuals (Taber et al., 1985). This is not a surprising conclusion, because the JDS and the JCI were developed to assess employees' perceptions. The usefulness of these psychological job characteristics, however, rests upon their relationships with objective properties of jobs. This claim was originally made by Walker (as cited in Turner & Lawrence, 1965, pp. 6-7) in 1951, and it still applicable in the 1990s:

Since the engineering categories with which man built the factory and organized it have developed for the most part without reference to categories based on human behavior- except in a casual and random fashion- and since the categories and abstractions of social science have for the most part developed with only casual contact with technological and engineering developments, the necessity arises of bringing them together into a working relationship. (p. 211)

Therefore, the association between job design and job evaluation needs to be established to indicate the value of job characteristics. If jobs with higher job characteristics are worth more, then these jobs should have a higher wage than jobs lower levels of job characteristics. Thus, both of these areas should have a strong association with pay.

The final objective of this investigation was to determine if the relationship between job evaluation and job

redesign was similar across job families. Research examining the association between job characteristics and job evaluation examined individuals across numerous jobs and job families. Dunham (1977) sampled 256 employees at a large pharmaceutical plant, while Rousseau (1982) investigated 1515 individuals from a national probability sample of the U.S. labor force. The number and types of jobs included in these studies was not disclosed. Taber et al. (1985) sampled 308 employees in 90 different jobs from laborers to skilled craftsmen. None of these three studies investigated whether the differences across jobs may moderate their findings. The next two studies investigating the relationship between job design and job evaluation (Campion, 1989; Campion & Berger, 1990) sampled 1145 people in 213 different jobs. Both studies had the same two samples. One sample in both studies consisted of 121 people in 121 different blue-collar jobs. These 121 jobs were all located in a low technology industry. The other sample was comprised of 1024 subjects in 92 diverse jobs in a high technology industry. Of these 92 jobs, 73 (79.3%) were white-collar occupations. Results indicated comparable findings across the two samples, but the researchers did not specifically address a blue-collar/white-collar dimension. The most recent study (Campion & McClelland, 1991) that examined the relationship between job redesign and job evaluation was conducted within the context of clerical

occupations. They did not include another classification of jobs as a comparison group to ascertain the generalizability of their findings. The following study investigated the relationship between job design and job evaluation within the context of professional/scientific jobs and clerical jobs to determine any potential differences in the magnitude of the relationship between job evaluation and job design due to differences between job families.

Based upon the above objectives, four outcomes were expected to occur as a result of this investigation. One hypothesis was that there will be a stronger relationship between measures within a single construct than among pairs of measures of different constructs. Second, there will be moderate convergence ( $.40 < r < .70$ ) between job evaluation measures and job characteristic inventories. Third, both job evaluation instruments and job characteristic inventories will be substantially related to job wage. Fourth, the relationship between job evaluation and job redesign will be consistent across job families.

To meet the aforementioned objectives and to adequately test the above hypotheses, a variety of jobs were analyzed using two job evaluation instruments and two job design inventories (the JDS and the JCI). The wages associated with these jobs were also collected. The exact procedure to test these hypotheses is discussed in detail in the next section.

## METHOD

## Subjects

Four hundred forty five employees of a large midwestern university were the subjects in this study. Two hundred eleven of the subjects (47.4%) were employed in ten professional/scientific occupations, while two hundred thirty four (52.6%) were employed in ten clerical occupations. These subjects represented 20 different jobs (10 professional/scientific, 10 clerical) in the organization. The list of these jobs is presented in Table 1. It was assumed that selecting 10 jobs within each classification provided a representative sample of each classification. Furthermore, by randomly sampling approximately 20 incumbents per job, the mean values on the job design measures would be representative of that job. Employees were selected on the basis of being employed in a clerical or professional/scientific occupation that had at least 20 incumbents. If the job had less than 40 incumbents, all of the incumbents were sent a survey. However, if the job had more than 40 incumbents, a random sample of 40 incumbents was drawn from that job.

## Instrumentation

Two job characteristic inventories were used in this study: the Job Diagnostic Survey (JDS; Appendix A) developed by Hackman and Oldham (1975) and the Job Characteristic Inventory (JCI; Appendix B) developed by Sims, Szilagyi, and

Keller (1976). The items that pertain to each scale for the JCI and JDS are identified in the appendices. The psychometric properties of both instruments were described in the previous section.

The two job evaluation instruments that were used in this study were the Factor Evaluation System Primary Standard (FES; Appendix C), an instrument of the U.S. Civil Service Commission, Bureau of Policies and Standards, consisting of nine factors, and an evaluation system that was designed for the State of Iowa (Arthur Young and Company, 1984; Appendix D). The State of Iowa (SOI) job evaluation system has 13 compensable factors. These two job evaluation instruments differ in many ways: the number of compensable factors, the number of levels representing each factor, the descriptions of the factors and factor levels, and the point values assigned to each of the factor levels.

These two job evaluation measures were applied to all 20 jobs to establish a relative ranking of these jobs within this given organization. For each job, values were assigned to each factor of the job evaluation instrument and the sum of these values was a measure of the total worth of the job. The procedure to assign these values to the compensable factors had been previously determined in the development of both job evaluation instruments (see Appendices C & D). Therefore, the relative worth of these jobs was established.

As a result of the Equal Pay Act of 1963, job evaluation instruments are required to assess levels of skill, effort, responsibility, and working conditions for jobs. In order to determine which compensable factors in the job evaluation instruments measure skill (S), responsibility (R), effort (E), and working conditions (WC), the results of a previous study employing both instruments was used. In Collins (1989) a panel of four industrial/organizational psychologists and one industrial relations expert on classification determined which of the four traits were measured by each factor. A consensus of 60% or greater determined which trait was assigned to each factor. The results of this procedure were as follows:

<u>FES</u>			<u>SOI</u>		
<u>Factor</u>	<u>Trait</u>	<u>%</u>	<u>Factor</u>	<u>Trait</u>	<u>%</u>
1	S	100	1	S	100
2	R	100	2	S	80
3	S	60	3	R	80
4	-	-	4	R	100
5	R	80	5	R	80
6	S	60	6	E	100
7	S	80	7	E	100
8	E	100	8	-	-
9	WC	100	9	R	100
			10	R	100
			11	WC	100
			12	WC	100
			13	E	80

S = Skill  
 R = Responsibility  
 E = Effort  
 WC = Working Conditions

No consensus was reached on factor four of the FES job evaluation procedure. Therefore, this factor was not considered in this study. Furthermore, factor eight of the State of Iowa job evaluation measure was also omitted, because it assesses supervisory components of the job rather than skill, effort, responsibility, or working conditions.

#### Procedure

Information for this investigation was obtained from five sources. These sources are: the two job evaluation instruments, the two job characteristic inventories, and a page of demographic questions including the pay associated with each job. The first step in this research was the collection of the job evaluation data for the twenty jobs. Two individuals who were knowledgeable of the ten clerical jobs (a personnel officer and a personnel service manager), and two individuals (the associate provost and the director of computational services) who were knowledgeable about the ten professional/scientific jobs applied both job evaluation procedures to the chosen jobs.

Next, the two job characteristic inventories were distributed to all of the subjects plus a page of demographic questions (age, gender, job tenure, organizational tenure, educational level, and pay). An additional page of items pertaining to positive and negative work behaviors was also

included at the end of packet for a different research project.

### Unit of Analysis

One of the most critical questions to be addressed in this study before analyzing the data was: What is the unit of analysis? There were two options: individuals or jobs. Roberts, Hulin, and Rousseau (1978) indicated that the dependent variable(s) should dictate the level of aggregation. This study addressed the question: To what degree is job design related to job worth as measured by job evaluation? The unit of analysis for job evaluation is the job. Therefore, data for this study were analyzed at the job level. Individual level data (e.g., job characteristic surveys) were aggregated for each job, except for reliability analyses. The mean scores for the jobs were used as the data. Thus, the sample size for this research was twenty for analyses across the job families and was ten for within job family analyses. Individual differences within a given job were considered error variance for the analyses. The key assumption in these analyses was that individuals within a job are performing similar tasks (Roberts et al., 1978).

### Data Analysis

(1) The data analysis began with descriptive statistics. Means and standard deviations for all variables (two job evaluation measures, two job characteristic indices, pay,



gender, age, job tenure, organizational tenure, and educational level) were computed to ascertain possible range restriction effects. The means were then converted to standard scores. The standard scores were used for all analyses, except for the reliability coefficients.

(2) The reliability of the job design instruments was calculated by two methods. The reliability estimates of the JCI and JDS were the only analyses that used individuals as the unit of analysis. First, internal consistency reliability of the JCI and JDS scales and total scores were computed using coefficient alpha. It is important to note that total scores for the JCI was based on the entire scale, which has thirty items and six scales, whereas total score on the JDS was based on fifteen items and five scales. Only the four scales that common to both measures were reported (autonomy, task identity, variety, and feedback) to allow for comparisons between the scales for all analyses. The second method for assessing reliability was by using Hoyt's Anova method for each job. This procedure reveals the extent of variability in scores due to the consistency in the items versus the influence of an interaction between people and items (error). This method was applied to all twenty jobs individually to determine if the influence of the interaction (error) was greater in some jobs and in some job design scales than others.

(3) To estimate the convergent and discriminant validity of the job characteristic inventories, correlations between scores on the common JDS and JCI scales were calculated across the jobs ( $n=20$ ). It was hypothesized that the magnitude of the correlations between corresponding scales on the JCI and JDS (convergent validity) would be higher than any of the other associations among the different scales and different measures (discriminant validity).

(4) The reliability of the job evaluation instruments was also calculated. First, internal consistency reliabilities (coefficient alpha) were computed for each job evaluation method within and across the four raters. Second, to ascertain the level of consistency between the raters' evaluations of the jobs, inter-rater reliabilities of the job evaluation instruments were calculated. Because there were two raters for each job, inter-rater reliabilities were computed for both the FES and SOI based upon correlating the raters' total evaluations within each job family. Due to the fact that the correlation between the two raters does not reveal the reliability of both raters, but rather the reliability of either judge (Rosenthal & Rosnow, 1991), the aggregate or effective reliability was also calculated. The Spearman-Brown formula is used to estimate effective reliability (see Rosenthal & Rosnow, 1991, p. 51).

(5) To assess the convergent and discriminant validity of the job evaluation instruments, correlations among the FES and SOI components and total scores were computed. It was hypothesized that the magnitude of the correlations between corresponding factors on the FES and SOI (convergent validity) would be higher than any of the other associations among the different components and different measures (discriminant validity).

(6) The subsequent set of analyses examined the relationships among the demographic variables (age, gender, job tenure, organizational tenure, educational level, and most importantly pay) with the job evaluation components and the job design variables. It was anticipated that the jobs that were worth the most to the institution would be characterized by higher pay, more required education, and more organizational experience (organizational tenure) than jobs worth less to the company. In terms of the job design variables, it was hypothesized that jobs high in variety, autonomy, and task identity would be strongly associated with required education, experience in the company and on the job (organizational and job tenure), and salary. The role of feedback in relation to the demographic variables was unclear prior to analysis.

(7) The next series of analyses were the main focus of this study. They examined the relationships between job

evaluation scores and the scores on the job characteristic variables. The JCI and JDS variables as well as total scores were correlated with the job evaluation factors from both the FES and the SOI across the jobs (n=20). There were several expected outcomes: (a) Autonomy (freedom on the job) would be highly associated with responsibility; (b) Skill variety, by definition, should be strongly related to skill; (c) Skill variety was also expected to be related to responsibility and effort, because if there is a substantial amount of skill variety on the job, it was anticipated that the employees are responsible for many work functions and need to exert a considerable amount of effort to meet all of the job requirements; (d) Task identity was hypothesized to be related to skill and responsibility, because if one does a project from beginning to end multiple skills will most likely be needed and that individual is completely responsible for the outcomes; (e) There was no anticipated linear links between feedback and any of the job evaluation components; and (f) Due to the predicted positive associations between many of the job characteristics and job worth, it was anticipated that total scores on the job design measures would be moderately related to total job worth.

(8) The last series of analyses were similar to the previous set, but the associations between job design and job evaluation were computed separately for professional/

scientific jobs and clerical jobs (n=10). These analyses, based on a sample size of ten jobs each, allowed for testing the generalizability of the relationships between the job characteristics and job worth across these two job families. There was no a priori reason to expect different associations across the two job families.

## RESULTS

Six hundred sixty three surveys were mailed to employees at the given institution. Of those 663 surveys, 445 (67.1%) were returned and provided useful information. The main descriptive indices from these responses are summarized in Tables 1 and 2. Table 1 indicates the number of respondents per job and the means of the variables of particular interest in this investigation. Only three of the jobs (15%) did not have at least fifteen respondents. Fourteen of the twenty jobs (70%) did have twenty or more participants. Both job families had well beyond two hundred respondents. Table 2 presents these means as standardized values.

The scores on the Job Characteristics Inventory (JCI) were higher for professional/scientific jobs than clerical jobs even though the two distributions had considerable overlap. The range of values on the JCI for the professional/scientific jobs were from 102 to 116, while clerical jobs ranged from 100 to 116. The average JCI score for professional/scientific jobs was 112 with a standard deviation of 5.0. The JCI mean, however, for clerical jobs was 106 with a standard deviation of 4.5. Therefore, the professional/scientific jobs, on average, have perceived levels of job characteristics more than one standard deviation above clerical jobs on the JCI ( $p < .05$ ). The standard deviations within the professional/scientific jobs varied from 10.8

(extension agent I) to 17.8 (specialist II). Similarly, the standard deviations within the clerical jobs ranged from 11.4 (secretary II) to 17.4 (secretary I). Therefore, clerical and professional/scientific jobs seem to be comparable in their levels of error variance (individual differences within jobs) as assessed by the JCI.

Table 1

Means of key variables by job and job family

<u>Job Title</u>	<u>N</u>	<u>JCI</u>	<u>JDS</u>	<u>FES</u>	<u>SOI</u>	<u>SALARY</u>
Extension Area Spec. III	26	115	87	4060	861	41,327
Associate Scientist	20	105	86	6085	1111	38,373
Manager II	34	113	85	4105	855	35,763
Coordinator III	20	115	86	3715	760	30,115
Extension Agent I	32	115	85	2275	558	27,969
Assistant Manager III	18	113	85	2235	510	27,096
Specialist II	17	116	87	2815	599	26,169
Programmer II	20	102	79	2890	676	25,968
Advisor II	10	106	87	3425	589	23,626
Research Associate I	14	110	82	3150	577	22,279
PROFESSIONAL/SCIENTIFIC	211	112	85	3492	727	30,952
Secretary III	27	107	82	3045	753	26,752
Secretary II	23	116	89	2140	590	23,998
Clerk III	26	107	78	2405	474	23,516
Account Clerk	20	109	82	2185	499	23,016
Clerk Typist III	27	108	82	1870	521	20,634
Library Assistant II	17	102	73	1670	481	18,393
Clerk II	26	105	75	1180	419	15,969
Library Assistant I	14	100	71	695	354	15,710
Clerk Typist II	26	102	74	1080	364	15,116
Secretary I	28	105	77	1295	383	14,650
CLERICAL	234	106	79	1799	489	19,896
<b>TOTAL</b>	<b>445</b>	<b>109</b>	<b>82</b>	<b>2606</b>	<b>603</b>	<b>25,609</b>

**Note:** N = number of respondents, JCI = Job Characteristics Inventory, JDS = Job Diagnostic Survey, FES = Factor Evaluation System Primary Standard, and SOI = State of Iowa Job Evaluation System.

The levels of perceived job characteristics obtained from the Job Diagnostic Survey (JDS) yielded analogous findings to the JCI. The average score on the JDS for professional/scientific jobs was 85 with a standard deviation of 2.6 and a range from 79 to 87. The clerical jobs had a mean score of 79 with a standard deviation of 5.5 and a range from 71 to 89. Thus, the professional/scientific jobs had average ratings on the JDS more than one standard deviation above the clerical jobs ( $p < .01$ ). An examination of the standard deviations of JDS scores within each job indicated a wide range of error variance on perceived job characteristics. At one extreme, for professional/scientific jobs, the coordinator III job had a standard deviation of only 6.1, while the specialist II job yielded a 15.8 standard deviation. Clerical jobs had standard deviations ranging from 7.1 (secretary II) to 15.7 (library assistant I). Therefore, the pattern of error variances (individual differences within jobs) within the job families were alike, although some jobs within each classification had significantly more error variance than others.

Overall, both the JCI and JDS revealed similar results. The professional/scientific job family had higher levels of perceived job characteristics than the clerical job family. Also, the levels of error variance were comparable across the jobs families.



The next two columns in Table 1 present the job evaluation results. The findings from the Factor Evaluation System Primary Standard (FES) indicate that professional/scientific jobs were worth considerably more to the organization than clerical jobs (3492 v. 1799 respectively). The job of an associate scientist appears to be the job that was worth the most (6085) to this organization, while the lowest rated job was that of an assistant manager III (2235) within the professional/scientific family. The highest rated clerical job was that of a secretary III (3045), while the lowest rated clerical job was library assistant I (695). According to the FES, these two job families are substantially different in their worth to this organization.

The State of Iowa Job Evaluation System (SOI) revealed comparable findings to the FES. Professional/scientific jobs were rated considerably higher than clerical jobs (727 v. 489 respectively). The highest rated professional/scientific job was associate scientist (1111), while the lowest rated job in this family was assistant manager III (510). Secretary III (753) was the highest rated clerical job and library assistant I (354) was the lowest rated clerical job, as measured by the SOI. Therefore, the FES and the SOI revealed similar results. In general, professional/scientific jobs were worth more to this organization than clerical jobs.

The last column in Table 1 provides the average salaries for the twenty jobs. It seems that professional/scientific jobs, on average, were paid approximately \$11,000 more a year than clerical jobs. The professional/scientific occupation with the highest average salary was the extension area specialist III (\$41,327), while the lowest average salary in this job family was the research associate I (\$22,279). Secretary III had the highest average salary (\$26,752) among the clerical jobs, while secretary I had the lowest average salary (\$14,650).

The standard scores in Table 2 revealed comparable results to Table 1. However, presenting these descriptive indices in standard deviation units indicated that the professional/scientific job family consistently scored over one standard deviation higher than clerical jobs on job design (.92, 1.24), job evaluation (1.34, 1.20), and job pay (1.36). Also, only one clerical job (secretary III) was above the mean for job worth and job pay across the 20 jobs and only one clerical job was above the mean for job design (secretary II). One p/s job did fall below the mean on job design (programmer II), whereas two p/s jobs fell slightly below the mean on the job worth measures (extension agent I & assistant manager III) and two p/s jobs fell slightly below the mean on job pay (advisor II & research associate I). Thus, it appeared that these two job families were distinct across these variables.

Table 2

Standard scores for key variables by job and job family

Job Title	JCI	JDS	FES	SOI	SALARY
Extension Area Spec. III	1.22	1.01	1.13	1.37	2.21
Associate Scientist	-.67	.82	2.72	2.67	1.82
Manager II	.84	.63	1.17	1.34	1.47
Coordinator III	1.22	.82	.86	.84	.71
Extension Agent I	1.22	.63	-.27	-.05	.42
Assistant Manager III	.84	.63	-.30	-.46	.30
Specialist II	1.41	1.01	.16	.00	.18
Programmer II	-1.24	-.49	.22	.41	.15
Advisor II	-.48	1.01	.64	-.05	-.16
Research Associate I	.27	.07	.42	-.11	-.34
PROFESSIONAL/SCIENTIFIC	.46	.62	.67	.60	.68
Secretary III	-.29	.07	.34	.81	.26
Secretary II	1.41	1.38	-.37	-.04	-.11
Clerk III	-.29	-.67	-.17	-.65	-.18
Account Clerk	.09	.07	-.34	-.52	-.24
Clerk Typist III	-.10	.07	-.59	-.40	-.56
Library Assistant II	-1.24	-1.61	-.74	-.61	-.86
Clerk II	-.67	-1.23	-1.13	-.93	-1.19
Library Assistant I	-1.62	-1.98	-1.51	-1.27	-1.22
Clerk Typist II	-1.24	-1.42	-1.21	-1.22	-1.30
Secretary I	-.67	-.86	-1.04	-1.12	-1.36
CLERICAL	-.46	-.62	-.67	-.60	-.68

**Note:** JCI = Job Characteristic Inventory, JDS = Job Diagnostic Survey, FES = Factor Evaluation System Primary Standard, and SOI = State of Iowa Job Evaluation System.

In conclusion, the findings in Tables 1 and 2 indicate three main findings: (1) professional/scientific jobs had higher levels of perceived job characteristics (approximately one standard deviation higher); (2) professional/scientific jobs were worth considerably more to the organization than clerical jobs (over one standard deviation); and (3) professional/scientific employees were paid more than clerical employees (about 1.4 standard deviations higher).

### The Job Characteristic Measures

Table 3 presents the internal consistency reliabilities of the job characteristic measures. The overall coefficient alpha for both the JCI and the JDS was .89. The scales on the JCI ranged from .76 (autonomy) to .88 (feedback). The JDS scales had coefficient alphas from .82 (variety) to .86 (task identity). It appears that both instruments were internally consistent. Their individual scales were also highly reliable.

Table 3

Reliability (coefficient alpha) of the job characteristic measures

<u>Instrument</u>	<u>reliability</u>
<b>Job Characteristics Inventory</b>	
Autonomy	.76
Task Identity	.86
Variety	.86
Feedback	.88
TOTAL	.89
<b>Job Diagnostic Survey</b>	
Autonomy	.84
Task Identity	.86
Variety	.82
Feedback	.83
TOTAL	.89

n=445

The internal consistency of the JCI and JDS was also assessed within each job through the application of Hoyt's Anova method (Table 4). The professional/scientific job family had numerous low reliability coefficients for the JCI and JDS. Total score reliabilities, however, ranged from .71 to .95 on the JCI, and from .62 to .97 on the JDS. The reliability on the autonomy scale on the JCI varied from .33 to .83. Similarly, autonomy on the JDS ranged from .35 to .95. Only three professional/scientific jobs had reliability coefficients above .70 for both autonomy scales. Task identity had acceptable and consistent reliabilities on the JCI. These values ranged from .80 to .95. The JDS task identity scale had varying reliabilities across the professional/scientific jobs. These coefficients fluctuated from .55 to .97. Three of which were below .70. The variety scale on the JCI had reliabilities from .57 to .89, whereas variety on the JDS had coefficients ranging from .58 to .90. Lastly, feedback on the JCI had reliability coefficients from .63 to .92, whereas feedback on the JDS had coefficients from .30 to .95. Half of the JDS feedback reliabilities were below .70 for professional/scientific jobs. Overall, 21 of these 100 reliability coefficients were below .70, 14 of which were from the JDS. This was not a surprising finding, because the JDS scales are much shorter in length (3 items per scale) than the JCI scales.

Table 4

Reliability of the job design measures for all jobs.

Job Title	JCI Tot	JDS Tot	JCI Aut	JDS Aut	JCI TI	JDS TI	JCI Var	JDS Var	JCI Feed	JDS Feed
PROFESSIONAL/SCIENTIFIC JOB FAMILY										
Advisor	.71	.89	.46	.75	.84	.90	.75	.87	.63	.85
Assoc. Sci.	.92	.85	.81	.95	.95	.94	.89	.81	.87	.58
Asst. Manager	.82	.89	.33	.88	.86	.55	.82	.90	.89	.87
Coordinator	.89	.62	.79	.89	.80	.65	.59	.78	.91	.62
Ext. Agent	.87	.83	.55	.51	.83	.74	.75	.58	.85	.76
Ext. Area Sp.	.90	.91	.65	.64	.84	.95	.57	.75	.88	.87
Manager	.88	.90	.83	.86	.84	.90	.77	.72	.88	.69
Programmer	.88	.82	.77	.83	.81	.56	.81	.73	.92	.65
Research Assoc	.89	.81	.77	.35	.87	.79	.79	.62	.92	.30
Specialist	.95	.97	.82	.94	.94	.97	.88	.70	.85	.95
TOTAL	.89	.87	.74	.85	.86	.83	.80	.73	.88	.76
CLERICAL JOB FAMILY										
Account Clerk	.84	.89	.78	.60	.94	.91	.81	.74	.93	.89
Clerk II	.83	.82	.69	.85	.81	.84	.88	.87	.89	.84
Clerk III	.83	.88	.68	.81	.80	.92	.72	.75	.85	.85
Clerk Typ. II	.89	.90	.77	.77	.82	.76	.76	.73	.80	.85
Clerk Typ. III	.90	.88	.49	.65	.88	.80	.86	.79	.84	.89
Lib. Asst. I	.86	.92	.61	.73	.87	.93	.85	.91	.64	.94
Lib. Asst. II	.92	.93	.83	.94	.93	.91	.76	.91	.92	.85
Secretary I	.93	.86	.87	.83	.78	.80	.84	.66	.90	.71
Secretary II	.85	.83	.64	.84	.71	.74	.82	.72	.90	.79
Secretary III	.91	.93	.89	.78	.80	.71	.88	.89	.90	.93
TOTAL	.89	.90	.77	.81	.86	.86	.85	.82	.87	.87
OVERALL	.89	.89	.75	.83	.87	.86	.85	.82	.88	.83
n=445										

The clerical jobs revealed more consistent and impressive findings for the JCI and the JDS than did professional/scientific jobs. None of the reliabilities for total scores on the JCI and JDS were below .80. Autonomy, however, had a considerable number (5 out of 10) of reliabilities on the JCI below .70. Reliability coefficients for this characteristic

ranged from .49 to .89 on the JCI, and from .60 to .94 on the JDS. Task identity had comparable reliabilities between the JCI and JDS for the ten clerical jobs, all of which were above .70. The median coefficient on the JCI for task identity was .82, whereas for the JDS the median values was also .82. The median value for variety on the JCI was .83 for clerical jobs, while .77 was the median coefficient on the JDS for variety. Feedback on the JCI had reliabilities ranging from .64 to .93, whereas feedback on the JDS had reliabilities from .71 to .94. Overall, only nine of the reliability coefficients for clerical jobs were below .70, seven of which came from the autonomy scales.

In summary, Table 4 revealed several notable findings: (1) across all twenty jobs the reliability of the job characteristics were acceptable; (2) within professional/scientific jobs there were numerous low reliabilities (below .70) for the JDS; (3) the autonomy scales on the JCI and JDS yielded many low reliability coefficients across the job families; and (4) values on the job characteristic measures for clerical jobs appeared to be less influenced by random errors (people x item interactions) than did values for the professional/scientific jobs.

The remainder of analyses in this study were conducted using jobs as the unit of analysis. Therefore, the sample size for analyses across the job families was 20, whereas

analyses within job families was 10. Sample sizes are listed at the bottom of each table to distinguish between across and within analyses.

The correlations among the JCI scales and with JCI total score were calculated (see Table 5). Although three of the correlations in this table were significant ( $p < .10$ ), the magnitude of these coefficients were moderate to low. These correlations ranged from  $-.44$  (feedback and variety) to  $.43$

Table 5

Correlations of JCI scales and total score

	<u>Autonomy</u>	<u>Task Identity</u>	<u>Variety</u>	<u>Feedback</u>	<u>TOTAL</u>
Autonomy	1.0				
Task Id.	.35	1.0			
Variety	.42*	.43*	1.0		
Feedback	.25	-.03	-.44*	1.0	
Total	.70***	.70***	.68***	.08	1.0

n=20

\* $p < .10$ , \*\*\* $p < .01$

(variety and task identity) with a median correlation among the JCI scales of  $.30$ . The JCI scales appear to be neither orthogonal nor highly redundant. An examination of the correlations between the JCI scales and JCI total scores reveals that three of the scales contribute approximately equally (ranging from  $.68$  to  $.70$ ) to the total score. Interestingly, feedback on the JCI appears to be virtually



unrelated to total score and negatively associated with variety. The other three variables are positively associated with each other and total score.

The correlations among the JDS scales and total score on the JDS were also computed (see Table 6). All of the correlations in this matrix were significant ( $p < .05$ ). Furthermore, the magnitude of the correlations among the JDS scales were considerably higher than the JCI scales. These correlations ranged from .46 (feedback and variety) to .86 (variety and autonomy) with a median value of .64, which was considerably larger than the median correlation among the JCI scales and larger than any correlation among the JCI scales. The JDS appears to have had more redundancy across its scales than the JCI. The correlations among the JDS scales and total scores ranged from .67 (feedback) to .93 (autonomy).

Table 6

Correlations of JDS scales and total score

	<u>Autonomy</u>	<u>Task Identity</u>	<u>Variety</u>	<u>Feedback</u>	<u>TOTAL</u>
Autonomy	1.0				
Task Id.	.71***	1.0			
Variety	.86***	.79***	1.0		
Feedback	.56**	.53**	.46**	1.0	
TOTAL	.93***	.85***	.86***	.67***	1.0

n=20

\*\* $p < .05$ , \*\*\* $p < .01$

The convergent validity between the job characteristic inventories was examined. The results are presented in Table 7. The main diagonal of the correlation matrix was of primary importance. The three of the four comparable scales on the JCI and the JDS were significantly correlated ( $p < .05$ ). The magnitude of these three correlations ranged from .45 (autonomy) to .87 (variety). Feedback on the two measures was virtually unrelated ( $r = .12$ ). For the JCI scales, except feedback, the strongest correlation was with the corresponding JDS scales. The JDS autonomy scale, however, was more strongly associated with task identity ( $r = .73$ ) and variety ( $r = .71$ ) on the JCI. Additionally, the feedback scale on the JDS correlated moderately with the autonomy scale on the JCI ( $r = .40$ ) and with the task identity scale on the JCI ( $r = .40$ ). The total score on the JCI was highly correlated with total

Table 7

Correlations among JCI and JDS scales

<u>JCI/JDS</u>	<u>Autonomy</u>	<u>Task Identity</u>	<u>Variety</u>	<u>Feedback</u>	<u>TOTAL</u>
Autonomy	.45**	.34	.45**	.40*	.47**
Task Id.	.73***	.81***	.64***	.40*	.73***
Variety	.71***	.56**	.87***	.17	.68***
Feedback	-.17	.05	-.23	.12	-.03
<u>TOTAL</u>	<u>.80***</u>	<u>.68***</u>	<u>.73***</u>	<u>.42*</u>	<u>.82***</u>

n=20

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$

score on the JDS ( $r=.82$ ). Therefore, high convergent validity between the JCI and JDS was found for task identity, variety, and total score.

The off-main diagonal correlations in Table 7 ranged from  $-.17$  (JCI feedback and JDS autonomy) to  $.73$  (JCI task identity and JDS autonomy), with a median correlation of  $.40$ . This finding implies that the degree of discriminant validity varies from scale to scale on the JCI and JDS. Comparable findings between these two measures will most likely occur with the variety and task identity scales, as well as with total scores. Autonomy and feedback may reveal different results between these two measures.

#### The Job Evaluation Instruments

The reliabilities of the job evaluation measures are presented in Table 8. Three types of reliability are presented in this table. Coefficient alphas were computed as estimates of internal consistency reliability for each measure by each rater and for each job family. The FES had coefficient alphas ranging from  $.70$  (the second professional/scientific rater) to  $.78$  (clerical raters). In general, the FES had moderately high internal consistency for each job family ( $.80$  &  $.85$ ) and across all jobs ( $.85$ ). Similar results were obtained for the SOI. It had coefficient alphas ranging from  $.82$  (professional/scientific rater 2) to  $.85$  (clerical raters). The SOI had impressive internal consistency

Table 8

Reliability estimates of the job evaluation measures

<u>Job Family</u>	<u>Measure</u>	<u>Alpha</u>	<u>Inter-rater</u>	<u>Effective</u>
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## Professional/Scientific

## Factor Evaluation System

Rater 1	.72			
Rater 2	.70			
Total	.80	.51		.68

## State of Iowa Job Evaluation System

Rater 1	.84			
Rater 2	.82			
Total	.86	.35		.52

## Clerical

## Factor Evaluation System

Rater 1	.78			
Rater 2	.78			
Total	.85	.60*		.75

## State of Iowa Job Evaluation System

Rater 1	.85			
Rater 2	.85			
Total	.91	.81***		.89

## TOTAL

## Factor Evaluation System

Total	.85	.60***		.75
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## State of Iowa Job Evaluation System

Total	.89	.42*		.59
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n=10 for within job family analyses.

n=20 for total analyses.

\*p&lt;.10, \*\*\*p&lt;.01

reliabilities for both job families (.86 & .91) and across all twenty jobs (.89).

The next two columns in Table 8 provide inter-rater reliability coefficients. There appeared to be a considerable amount of disagreement between the professional/scientific raters, especially using the SOI ( $r=.35$ ). The clerical job evaluators had substantially higher levels of agreement ( $r=.60$ ,  $r=.81$ ). Interestingly, the clerical raters had a higher level of agreement using the SOI as compared to the FES, while the professional/scientific evaluators had low levels of agreement using the SOI in relation to the FES. Overall, the FES ( $r=.60$ ) and the SOI ( $r=.42$ ) yielded moderate levels of inter-rater agreement. However, the effective or aggregate reliability estimates were acceptable (median  $r=.72$ ). Overall, it appears that the FES provided the most consistent findings between the job families, but the SOI seemed to be especially appropriate for the clerical jobs.

Table 9 presents the correlations among the job evaluation components and total score on the FES. The job evaluation components are not generally considered to be scales, because many of these components are based on only one or two items, especially for the effort and working conditions factors. The correlations in this table are rather diverse. Skill and responsibility on the FES were very highly correlated ( $r=.90$ ), while the other correlations were low

Table 9

Correlations among the FES scales and total score

	Skill	Resp.	Effort	Working Conditions	TOTAL
Skill	1.0				
Resp.	.90***	1.0			
Eff.	-.24	-.25	1.0		
W.C.	.31	.23	.21	1.0	
TOTAL	.99***	.95***	-.24	.29	1.0

n=20

\*\*\*p&lt;.01

and/or negative. Effort on the FES was not significantly correlated with skill ( $r=-.24$ ) and responsibility ( $r=-.25$ ). Working conditions, also, appeared to be relatively independent of the other actors and total score on the FES. The correlations for the working conditions factor ranged from .21 (with effort) to .31 (with skill). Total score on the FES appears to be a function of two components, skill and responsibility, which were highly correlated.

Table 10 shows the correlations among the SOI job evaluation components and total score on the SOI. Similar to the results from the FES, skill and responsibility on the SOI were very highly correlated ( $r=.94$ ). Effort on the SOI was not significantly correlated with skill and responsibility or working conditions (.22, .35, -.14 respectively). Similarly, working conditions had nonsignificant correlations with skill

Table 10

Correlations among the SOI scales and total score

	Skill	Resp.	Effort	Working Conditions	TOTAL
Skill	1.0				
Resp.	.94***	1.0			
Eff.	.22	.35	1.0		
W.C.	.26	.23	-.14	1.0	
TOTAL	.97***	.99***	.35	.27	1.0

n=20

\*\*\*p&lt;.01

( $r=.26$ ) and responsibility ( $r=.23$ ). Total score on the SOI was predominately based upon two factors: skill and responsibility. Comparable to the FES, effort and working conditions had limited associations with total score.

Overall, the total score for both job evaluation measures appeared to be based almost exclusively on the levels of skill and responsibility for the jobs. Furthermore, these two components were highly associated for both measures. Both the FES and the SOI revealed positive albeit limited associations for working conditions. Working conditions seems to be minor factor in determining job worth for both instruments. The effort component was negatively correlated with other factors for the FES, while it was positively correlated with other factors on the SOI, but all of these correlations were low to moderate and nonsignificant.

The convergent validity evidence of the two job evaluation measures is presented in Table 11. The main diagonal in this matrix provides the correlations between matching components on the FES and SOI. There appears to be a high degree of correspondence between the FES and SOI skill ( $r=.96$ ), responsibility ( $r=.88$ ), and working conditions ( $r=.69$ ) components. Total scores on both job evaluation instruments were also very highly correlated ( $r=.96$ ). The job evaluation effort factor, however, was virtually unrelated ( $r=-.18$ ) between the two measures.

The off-main diagonal correlations indicated a very strong association between the skill factor and responsibility factor (.95, .84) between the two instruments. There was also a moderately strong relationship between the SOI working conditions component and the FES effort component ( $r=.41$ ,  $p=.08$ ), however the correlation between the FES working conditions component and the SOI effort component was negative ( $r=-.22$ ). The remainder of these correlations were rather low, ranging from  $-.26$  to  $.33$ . Total score for each measure was strongly associated with the skill and responsibility factors (ranging from .87 to .96) of the other instrument. Effort and working conditions factors were not significantly correlated with total scores on either measure (ranging from  $-.24$  to  $.27$ ).



Table 11

Correlations among the FES and SOI scales and totals

<u>SOI/FES</u>	<u>Skill</u>	<u>Resp.</u>	<u>Effort</u>	<u>W.C.</u>	<u>TOTAL</u>
Skill	.96***	.84***	-.25	.27	.94***
Resp.	.95***	.88***	-.26	.26	.95***
Effort	.20	.33	-.18	-.22	.24
W.C.	.32	.15	.41*	.69***	.28
<u>TOTAL</u>	<u>.96***</u>	<u>.87***</u>	<u>-.24</u>	<u>.27</u>	<u>.96***</u>

n=20

Note: Resp.= responsibility, and W.C.= working conditions.

\*p&lt;.10, \*\*\*p&lt;.01

In conclusion, the FES and SOI provided comparable results, especially for evaluating jobs based upon the degree of skill and/or responsibility required. Both instruments did not emphasize the effort and working conditions components in determining total score. Furthermore, the degree of effort calculated by each measure appears to be unrelated.

#### The Demographic Variables

The correlations among the demographic variables were calculated (see Table 12). Organizational tenure was strongly associated with job tenure ( $r=.90$ ), age ( $r=.66$ ), and salary ( $r=.75$ ). Job tenure was also highly correlated with these three variables. It appears that neither the gender concentration nor education requirements of the jobs were related to average tenure in the company or in the job.

Table 12

Correlations among the demographic variables

	ORGTEN	JOBTEN	AGE	GENDER	EDUC.	SALARY
ORGTEN	1.0					
JOBTEN	.90***	1.0				
AGE	.66***	.58***	1.0			
GENDER	-.30	-.26	.05	1.0		
EDUC.	.15	.22	-.20	-.44*	1.0	
SALARY	.75***	.74***	.26	-.69***	.58***	1.0

n=20

Note: ORGTEN= organizational tenure, JOBTEN= job tenure EDUC.= EDUCATION. Also, gender coding was male=1 and female=2.

\*p<.10, \*\*\*p<.01

Salary was significantly associated with all of the demographic variables, except for the average age of incumbents per job ( $r=.26$ ). It appears that jobs that require more education, more experience, and were male-concentrated had higher job pay. The strong association between gender and job pay was expected, because 95% of the clerical employees were female and clerical jobs were paid an average of \$11,000 less than professional/scientific jobs (Table 1). Overall, there was considerable variety in the correlations among the demographic variables, ranging from  $-.69$  to  $.90$  with a median correlation of  $.22$ .

Correlations among the demographic variables and the job characteristic scales and total scores were also computed (see Table 13). Organizational tenure and job tenure appear to be

Table 13

Correlations among the demographic variables and the job characteristic variables

	ORGTEN	JOBTEN	AGE	GENDER	EDUC.	SALARY
AUTJCI	.67***	.70***	.38*	-.17	-.05	.47**
AUTJDS	.61***	.62***	.28	-.43*	.45**	.76***
TIJCI	.22	.22	-.02	-.19	.16	.34
TIJDS	.30	.27	-.09	-.32	.38*	.50**
VARJCI	.52**	.50**	.04	-.35	.57***	.75***
VARJDS	.58***	.57***	.04	-.40*	.51**	.74***
FEEDJCI	-.01	-.17	.21	.15	-.62***	-.38*
FEEDJDS	.31	.47**	.08	-.26	-.29	.43*
TOTJCI	.48**	.48**	.20	-.27	.26	.56**
TOTJDS	.55**	.54**	.17	-.41*	.47**	.73***

n=20

Note: ORGTEN=organizational tenure, JOBTEN=job tenure, EDUC.=education, AUTJCI=autonomy on the JCI, AUTJDS=autonomy on the JDS, TIJCI=task identity of the JCI, TIJDS=task identity on JDS, VARJCI=variety on JCI, VARJDS= variety on JDS, FEEDJCI=feedback on JCI, FEEDJDS=feedback on JDS, TOTJCI=total score on JCI, and TOTJDS=total score on JDS.

\*p<.10, \*\*p<.05, \*\*\*p<.01

related to autonomy, variety, and total job enrichment. Age and gender were not significantly related to any of the job characteristics and to total score on both the JDS and JCI. Educational characteristics of the jobs had mixed results with autonomy, feedback, and to a lesser extent with total job design. Variety, however, was strongly associated with educational characteristics of the jobs. Job pay was moderately to strongly associated with autonomy (.47, .76), task identity (.34, .50), variety (.75), and total job enrichment (.56, .73). Mixed results were found between job

pay and feedback. Feedback on the JCI had a negative association with pay ( $r=-.38$ ), whereas feedback on the JDS had a positive association with pay ( $r=.43$ ).

Table 14 presents the correlations among the demographic variables and the job evaluation components and total score. Based upon the findings in this table, it appears that the jobs that were characterized by employees with more experience within the organization have relatively more required skills ( $r=.62$ ) and responsibilities ( $r=.75$ ), which was also related to an increase in total job worth ( $r=.71$ ). Comparable results were found for job tenure. Average age of employees in the jobs seemed to be relatively independent (median  $r=.17$ ) of the job evaluation factors. Gender, however, was strongly associated with many of the job worth factors. For this organization, the female-concentrated jobs appeared to have lower level skills ( $r=-.64$ ), less responsibility ( $-.41, -.58$ ), and were generally worth less to the organization ( $r=-.59$ ). This result was anticipated due to the fact that the clerical jobs were predominately female and received much lower scores on the FES and SOI (Table 1). Educational demands of the jobs was positively associated with skill ( $r=.63$ ), responsibility ( $r=.56$ ), and total job worth ( $r=.60$ ).

Salaries associated with jobs are supposed to be based considerably upon job evaluation results. The correlations

Table 14

Correlations among the demographic variables and the  
job evaluation variables

	ORGTEN	JOBTEN	AGE	GENDER	EDUC.	SALARY
SkillFES	.65***	.65***	.15	-.63***	.64***	.89***
SkillSOI	.58***	.57***	.05	-.64***	.61***	.88***
ResFES	.72***	.70***	.24	-.41*	.58***	.81***
ResSOI	.78***	.70***	.34	-.58***	.52**	.90***
EffFES	-.14	-.08	-.03	.25	.15	-.12
EffSOI	.51**	.46**	.52**	.09	-.05	.34
WCFES	.27	.34	.11	-.29	.29	.28
WCSOI	.18	.28	.05	-.32	.39*	.32
TotFES	.69***	.68***	.18	-.57***	.63***	.88***
TotSOI	.72***	.67***	.24	-.60***	.56***	.91***

n=20

Note: ORGTEN=organizational tenure, JOBTEN=job tenure, EDUC.=education, SkillFES=skill on FES, SkillSOI=skill on SOI, ResFES=responsibility on FES, ResSOI=responsibility on SOI, EffFES=effort on FES, EffSOI=effort on SOI, WCFES=working conditions on FES, WCSOI=working conditions on SOI, TotFES=total score on FES, and TotSOI=total score on SOI.

\*p<.10, \*\*p<.05, \*\*\*p<.01

among the job evaluation factors and salary for these twenty jobs indicated a very strong relationship. Salary was highly correlated with skill ( $r=.89$ ), responsibility ( $r=.86$ ), and total worth ( $r=.90$ ). Interestingly, effort and working conditions were virtually unrelated to salary ( $r=.11$ ,  $r=.30$  respectively) and to any of the other demographic variables.

#### Job Evaluation and Job Design

The first set of analyses examined the relationships between the JCI variables and the job evaluation components (see Table 15). Correlations between autonomy and the job

Table 15

Correlations among job evaluation factors and JCI scales

	Autonomy	Task Identity	Variety	Feedback	TOTAL
SkillFES	.31	.37	.64***	-.39*	.34
SkillSOI	.29	.33	.68***	-.43*	.31
ResFES	.26	.36	.59***	-.38*	.33
ResSOI	.35	.26	.63***	-.35	.32
EffFES	.01	-.35	.14	-.27	-.12
EffSOI	.34	.25	.15	-.02	.29
WCFES	.26	.26	.35	-.32	.21
WCSOI	.24	.18	.51**	-.31	.26
TotFES	.30	.37	.64***	-.40*	.34
TotSOI	.35	.31	.68***	-.41*	.35

n=20

**Note:** SkillFES=skill on FES, SkillSOI=skill on SOI, ResFES=responsibility on FES, ResSOI=responsibility on SOI, EffFES=effort on FES, EffSOI=effort on SOI, WCFES=working conditions on FES, WCSOI=working conditions on SOI, TotFES=total score on FES, and TotSOI=total score on SOI.

\* $p < .10$ , \*\*\* $p < .01$

evaluation factors were moderately strong (median  $r = .30$ ), but due to the limited number of jobs none of these values were statistically significant. Task identity was also moderately correlated with the job evaluation components (median  $r = .28$ ), but none of these values were significant. Variety on the JCI correlated highly with skill ( $r = .66$ ), responsibility ( $r = .62$ ), working conditions ( $.35, .51$ ), and total job worth ( $r = .66$ ). Feedback on the JCI was associated negatively with all of the job evaluation factors. Most of these associations were

moderate in magnitude. They ranged from  $-.43$  to  $-.02$  with a median correlation of  $-.36$ .

Total score on the JCI was moderately related to skill ( $r=.32$ ), responsibility ( $r=.33$ ), working conditions ( $r=.24$ ), and total worth ( $r=.35$ ). All of these correlations were not statistically significant.

In summary, all of the JCI scales and total scores had at least moderate associations with the job evaluation factors of skill, responsibility, and total worth. Feedback on the JCI had an inverse relationship with the job evaluation components, albeit limited in magnitude. Variety was the only job characteristic that was strongly related to job evaluation factors, particularly skill, responsibility, and total worth. There were no consistent findings between the effort factor and the JCI scales.

The JDS variables were also correlated with the job evaluation components (Table 16). The autonomy scale on the JDS was correlated highly with skill ( $r=.64$ ), responsibility ( $r=.66$ ), and total job worth ( $r=.66$ ). Task identity on the JDS was also correlated substantially with skill ( $r=.56$ ), responsibility ( $r=.48$ ), and total job worth ( $r=.54$ ). Variety on the JDS was highly correlated with skill ( $r=.72$ ), responsibility ( $r=.70$ ), and total job worth ( $r=.72$ ). Feedback on the JDS was moderately correlated with skill ( $r=.46$ ), responsibility ( $r=.46$ ), and total job worth ( $r=.46$ ). These

Table 16

Correlations among job evaluation factors and JDS scales

	Autonomy	Task Identity	Variety	Feedback	TOTAL
SkillFES	.66***	.57***	.72***	.49**	.66***
SkillSOI	.61***	.54**	.71***	.44*	.63***
ResFES	.68***	.51**	.72***	.56***	.68***
ResSOI	.63***	.45**	.66***	.36	.61***
EffFES	-.32	-.35	-.19	-.41*	-.41*
EffSOI	.41*	.14	.22	.23	.35
WCFES	.28	.25	.34	.02	.18
WCSOI	.28	.17	.33	-.06	.15
TotFES	.68***	.56**	.74***	.52**	.68***
TotSOI	.65***	.51**	.71***	.39*	.64***

n=20

Note: SkillFES=skill on FES, SkillSOI=skill on SOI, ResFES=responsibility on FES, ResSOI=responsibility on SOI, EffFES=effort on FES, EffSOI=effort on SOI, WCFES=working conditions on FES, WCSOI=working conditions on SOI, TotFES=total score on FES, and TotSOI=total score on SOI.

\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$

correlations were significant ( $p < .05$ ). Finally, total score on the JDS was correlated highly with skill ( $r = .64$ ), responsibility ( $r = .64$ ), and total job worth ( $r = .66$ ). In summary, all of the JDS scales as well as total score were strongly associated with skill, responsibility, and total worth across the FES and SOI. The relationships among the JDS scales and working conditions were positive, but modest at best. Inconsistent results were found across the FES and SOI regarding effort with the JDS scales.



Correlations between the JCI scales and the job evaluation components were calculated within each job family (Table 17). Autonomy on the JCI had a moderate association with working conditions ( $r=.45$ ,  $p=.19$ ) for professional/scientific jobs, however for clerical jobs autonomy was moderately related to skill ( $r=.47$ ,  $p=.16$ ), responsibility (.53, .34), and total worth ( $r=.47$ ). This characteristic was virtually unrelated to working conditions for clerical jobs ( $r=-.14$ ). Considerable differences between the job families also occurred with task identity on the JCI. This variable was inversely related to skill ( $r=-.48$ ,  $p=.15$ ), responsibility ( $r=-.58$ ), and total worth ( $r=-.54$ ,  $p=.11$ ) for professional/scientific jobs. For clerical jobs, task identity was positively associated with skill ( $r=.58$ ), responsibility ( $r=.55$ ), and total worth ( $r=.60$ ). Variety on the JCI revealed large discrepancies between the job families. It was correlated moderately with effort (.75, .43), and working conditions (.21, .68) for professional/scientific jobs, whereas for clerical jobs the strongest associations with variety were skill ( $r=.70$ ), responsibility ( $r=.64$ ), and total worth ( $r=.66$ ). Feedback on the JCI had nonsignificant relationships with effort ( $r=-.45$ ) for professional/scientific jobs and working conditions (-.39, -.21) for clerical jobs. The other values with feedback on the JCI were also weak. Lastly, total score on the JCI was not significantly related

Table 17

Correlations among job evaluation factors and JCI scales by job families

	Autonomy		Task Id.		Variety		Feedback		TOTAL	
SkilF	22	(49)	-44	(65)	25	(62)	-16	(22)	-29	(62)
SkilS	19	(45)	-52	(53)	25	(77)	-33	(28)	-39	(66)
ResF	03	(53)	-58	(60)	07	(60)	-23	(17)	-33	(57)
ResS	33	(34)	-57	(50)	31	(67)	-16	(06)	-15	(48)
EffF	17	(-12)	25	(-63)	75	(-16)	-45	(-30)	32	(-49)
EffS	20	(51)	-49	(66)	43	(17)	-44	(28)	25	(51)
WCF	42	(-13)	13	(-10)	21	(-07)	00	(-39)	04	(-09)
WCS	47	(-14)	22	(-06)	68	(06)	-11	(-21)	32	(-16)
TotF	17	(51)	-50	(63)	21	(62)	-19	(20)	-31	(61)
TotS	30	(42)	-57	(57)	36	(70)	-29	(17)	-21	(58)

n=10

Note: decimals points have been omitted.

Note: the first correlation in each pair was based only on professional/scientific jobs, while the correlation in parentheses was based only on clerical jobs.

Note: correlations at or above .55 are significant at  $p=.10$ , correlations at or above .63 are significant at  $p=.05$ , while correlations at or above .77 are significant at  $p=.01$ .

Note: SkilF=skill on FES, SkilS=skill on SOI, ResF=responsibility on FES, ResS=responsibility on SOI, EffF=effort on FES, EffS=effort on SOI, WCF=working conditions on FES, WCS=working conditions on SOI, TotF=total score on FES, and TotS=total score on SOI.

to skill ( $r=-.34$ ) for professional/scientific jobs, but significantly related to skill ( $r=.64$ ), responsibility ( $r=.53$ ), and total worth ( $r=.60$ ) for clerical jobs. It appears that based on the findings in Table 16, the JCI reveals substantial differences among the relationships between job design and job worth across the two job families.

The last series of analyses examined the JDS scales with the job evaluation factors within each job family (Table 18). Autonomy on the JDS had nonsignificant associations with responsibility ( $r=.33$ ), effort ( $.18, .53$ ), and total worth ( $r=.27$ ) for professional/scientific jobs. This JDS scale, however, had strong associations with skill ( $r=.69$ ), responsibility ( $r=.63$ ), and total job worth ( $r=.69$ ) for clerical jobs. For professional/scientific jobs, the only moderately strong relationship for task identity on the JDS was with working conditions ( $r=.32$ , ns). For clerical jobs, task identity was substantially related to skill ( $r=.63$ ), responsibility ( $r=.50$ ), and total job worth ( $r=.58$ ). Variety on the JDS was positively associated with all job evaluation components for professional/scientific jobs. These coefficients were similar in magnitude, ranging from .34 (skill) to .54 (working conditions). However, all of these correlations were not statistically significant. For clerical jobs, variety was highly correlated with skill ( $r=.71$ ), responsibility ( $r=.63$ ), and total worth ( $r=.69$ ). Feedback on the JDS did not reveal any substantial relationships with job evaluation factors for clerical jobs, but for professional/scientific jobs all of the relationships were at least moderate in magnitude, except for effort which had mixed results. Finally, JDS total score was nonsignificantly correlated with responsibility ( $r=.34$ ) and total job worth

Table 18

Correlations among job evaluation factors and JDS scales by job families

	Autonomy		Task Id.		Variety		Feedback		TOTAL	
SkilF	23	(71)	06	(61)	41	(68)	51	(17)	22	(73)
SkilS	02	(66)	-14	(64)	27	(74)	41	(08)	-03	(76)
ResF	30	(66)	-15	(49)	41	(64)	80	(18)	35	(62)
ResS	36	(59)	-12	(50)	46	(62)	47	(-10)	32	(61)
EffF	18	(-61)	18	(-61)	49	(-46)	-58	(-32)	-06	(-64)
EffS	53	(68)	-61	(57)	36	(47)	36	(28)	44	(60)
WCF	00	(00)	27	(-20)	45	(-24)	-33	(-13)	-12	(-21)
WCS	37	(-12)	37	(-27)	62	(-13)	-46	(-14)	17	(-27)
TotF	26	(70)	00	(57)	43	(68)	62	(17)	27	(69)
TotS	27	(67)	-16	(59)	44	(69)	42	(00)	21	(70)

n=10

Note: decimals points have been omitted.

Note: the first correlation in each pair was based only on professional/scientific jobs, while the correlation in parentheses was based only on clerical jobs.

Note: correlations at or above .55 are significant at  $p=.10$ , correlations at or above .63 are significant at  $p=.05$ , while correlations at or above .77 are significant at  $p=.01$ .

Note: SkilF=skill on FES, SkilS=skill on SOI, ResF=responsibility on FES, ResS=responsibility on SOI, EffF=effort on FES, EffS=effort on SOI, WCF=working conditions on FES, WCS=working conditions on SOI, TotF=total score on FES, and TotS=total score on SOI.

( $r=.24$ ) for professional/scientific jobs. For clerical jobs, total score on the JDS was highly related to skill ( $r=.75$ ), responsibility ( $r=.62$ ), and total job worth ( $r=.70$ ).

Comparable to the results found with the JCI, the JDS revealed numerous considerable differences between the job families among the relationships between job design and job evaluation.

### Summary

Data analysis for this study was based on 445 respondents in twenty jobs: ten professional/scientific and ten clerical. Descriptive analyses revealed that professional/scientific jobs had higher levels of perceived job characteristics, higher levels of job worth, and were on average paid considerably more than clerical jobs.

The two measures of job design, the JCI and the JDS, were internally consistent and correlated highly with each other, except for the feedback scales. The two job evaluation measures, the FES and the SOI, had moderate reliability evidence and correlated strongly with each other, except for the effort component.

The only job characteristic variable on the JCI that was highly related to job worth was variety. It was strongly associated with skill, responsibility, working conditions, and total job worth. The other JCI scales, except feedback, had modest relationships with skill, responsibility, working conditions, and total job worth. Variety, autonomy, task identity and total score on the JDS correlated significantly with skill, responsibility, and total job worth. Feedback on the JCI had negative moderate relationships with job worth indices, while feedback on the JDS had positive moderate associations with job worth indices. Effort had mixed results with the JCI and JDS scales.

Correlations among the job design measures with the job evaluation instruments within each job family yielded substantial differences across the two classifications. The strongest relationships between job worth and job design occurred in the clerical job family for both the JCI and JDS.

Finally, job pay was very highly related to levels of skill, responsibility, and total worth across the twenty jobs. Pay was also strongly associated with autonomy, variety, and total level of perceived job characteristics.

## DISCUSSION

The relationship between job evaluation and job design was examined in this study across twenty jobs. Two job evaluation measures and two job characteristic inventories were utilized to investigate the associations between job design and job worth.

The unit of analysis for this study was jobs, because the objective of the study was to assess the association that job characteristics had with job evaluation. These constructs dictated the unit of analysis (Roberts et al., 1978). The major limitation of using jobs as the unit of analysis in this study was that the sample size was reduced to twenty. The power to detect a large effect size ( $r=.50$ ) with a sample size of twenty was .60 (two-tailed,  $p<.05$ ). The power to detect a medium effect size ( $r=.30$ ) at the same level of statistical significance was only .25 (Rosenthal & Rosnow, 1991). The power of the analyses were further reduced within job families (.30 for a large effect size and .15 for a medium effect size).

Due to the limited power of the analyses, it was not surprising that many of the moderately sized correlations were not statistically significant ( $p<.05$ ). The psychological literature on statistical significance, however, has clearly indicated that significance levels are the least important attribute of research (Bakan, 1966; Cohen, 1990; Lykken, 1968;

Meehl, 1978; Meehl, 1990). It is a widely accepted belief that the null hypothesis ( $H_0: r=.00$ ) is never true (Bakan, 1966; Campbell, 1982; Kish, 1959). Meehl (1990) asserted that in the social sciences everything is correlated with everything else, which he referred to as the "crud factor". Therefore, if a correlation was not significant it most likely due to the limited sample size, not that there was no association. Additionally, because significance levels ( $p<.05$  or  $p<.01$ ) are basically arbitrary cutoffs (Cohen, 1990; Skipper, Guenther, & Nass, 1967), implications of the results in this study were discussed based primarily on the magnitude of the effect size. Statistical significance was not emphasized in this study.

The descriptive analyses on the variables of interest indicated that professional/scientific jobs had higher levels of job characteristics, job evaluation, and higher salary than clerical jobs (Table 1). Therefore, initially there was evidence that these three characteristics were positively associated across the two families. A check of other descriptive analyses suggested that range restriction and unequal variances were not a factor in the scores on the variables. Furthermore, the amount of error variance (individual differences within jobs) was comparable across both job families and across both job characteristic instruments.



## The Job Characteristic Instruments

### Reliability

Internal consistency reliability was computed for both the JCI and JDS (Table 2). The coefficient alphas for the JDS ranged from .82 (variety) to .89 (total score). These reliabilities were much higher than those reported in the original study by Hackman and Oldham (1975) and the meta-analysis by Taber and Taylor (1990) on the JDS. Hackman and Oldham (1975) indicated internal consistency reliabilities for the JDS scales only in the .60s. Coefficient alphas reported by Taber and Taylor (1990) were also in the .60s and low .70s.

Internal consistency reliabilities for the JCI varied from .76 (autonomy) to .89 (total score). These results were slightly higher than the coefficient alphas in the original study on the JCI (Sims, Szilagyi, & Keller, 1976), which generate reliability coefficients in the upper .70s and low .80s. Other studies on the JCI have yielded coefficient alphas in the .80s and low .90s (c.f., Keller, Szilagyi, & Holland, 1976). Overall, it appears that both the JCI and JDS had acceptable internal consistency reliability across the twenty jobs.

The reliability of both measures by job was also examined by applying Hoyt's Anova method to the data (Table 3). This procedure exposed the amount of random error (people x item interaction) in job characteristic scores for each job. All

past studies on the JCI and JDS have used individuals as the unit of analysis. Therefore, this method was not applicable for those other research investigations.

The professional/scientific (p/s) job family seemed to be more influenced by random error than clerical families. For total score on the measures two p/s jobs had reliability coefficients below .80: advisor II (.71 on JCI) and coordinator III (.62 on JDS). None of the clerical jobs had total score reliabilities under .80.

The autonomy scales were comparably unreliable across both job families. Seven of the ten p/s jobs had at least one reliability coefficient below .80 for autonomy. Similarly, eight of the ten clerical jobs had at least one reliability coefficient below .80. The autonomy scale on the JCI had many more reliability coefficients below .70 (45%) than did the autonomy scale on the JDS (25%). It appears that autonomy scores, especially on the JCI, could produce unreliable findings.

The task identity scale on the JCI was quite consistent and acceptable in its levels of reliability across the twenty jobs. None of the jobs had reliability below .70 on this scale and 90% were at least .80. Task identity on the JDS had acceptable reliabilities as well (at least .70) on all of the clerical jobs and 70% of the p/s jobs. However, only 60% of

the jobs had internal consistency reliabilities above .80 for this JDS scale.

Variety on the JCI had acceptable levels of reliability (at least .70) for all of the clerical jobs and 80% of the p/s jobs. Comparably, variety on the JDS had acceptable reliability coefficients on 90% of the clerical jobs and 80% of the p/s jobs.

Only one p/s job (advisor II) and one clerical job (library assistant I) had reliabilities below .80 on the feedback scale on the JCI. However, two clerical jobs and six p/s jobs had reliabilities below .80 for feedback on the JDS (5 of which were below .70).

Overall, it appeared that the job characteristic values for both measures across the twenty jobs were reliable. Autonomy on the JCI may be the only exception. Sampling approximately twenty employees per job yielded relatively consistent findings. Based upon these results, it appears that one could be confident that the scores on the job characteristic measures were true approximations or representations of the levels of job design for these twenty jobs. If these findings were not as impressive, then aggregating across jobs most likely would have generated unreliable results.

### Convergent and Discriminant Validity Evidence

The next series of analyses were correlations among the JCI and JDS scales. Intercorrelations among the JCI scales (Table 4) had moderate associations ( $-.44$  to  $.43$ ). Except for the negative associations with feedback, these correlations were consistent with the findings of other studies on the JCI (Brief & Aldag, 1978; Pierce & Dunham, 1978a; Pierce & Dunham, 1978b). The inverse association between feedback and variety on the JCI ( $r = -.44$ ) has not been found in other studies. One possible explanation for this result is that this is the only study that examined the JCI using jobs as the unit of analysis. It is plausible that jobs that are characterized by multiple activities may have less supervision to provide feedback than jobs with only a few tasks. The other associations within the JCI suggest that jobs high in one job characteristic have a slight tendency to be high in other job characteristics.

Intercorrelations among the JDS scales (Table 5) showed a lack of discrimination. All of the associations were positive and above  $.45$ . The average intercorrelation across the JDS scales was  $.65$ . All of these values were higher than the average correlations reported in the Taber and Taylor (1990) meta-analysis. It appears that at the job level, the jobs high in one job characteristic have a strong tendency to be high in other job characteristics.

One of the hypotheses of this study was that there would be high convergent validity evidence between the JCI and JDS. Task identity ( $r=.81$ ), variety ( $r=.87$ ) and total score ( $r=.82$ ) on the job design measures showed high convergent validity. Over 65% in the variance in scores on one measure was accounted for by scores in the other measures' corresponding scale for these three job design variables. Autonomy on the JCI was correlated .45 with autonomy on the JDS. Even though this value was statistically significant, only 20% of the variance can be accounted for across the two measures on this variable. This result was not unexpected due to the limited reliability of the autonomy scales (Table 3) for many of the jobs, especially for the JCI.

The feedback scales did not show any convergence across the two measures ( $r=.12$ ). This result was somewhat surprising, although the two measures conceptualize feedback differently. The JCI items approach feedback from the perspective of how much feedback employees receive from their supervisors and coworkers. The JDS feedback items examine feedback from doing the job itself independent of input received from coworkers and supervisors. Therefore, although the scale titles are congruent, the definitions of feedback were independent.

Only one other study had employees complete both the JCI and JDS (Pierce & Dunham, 1978a). Their results indicate

convergent validities in the .60s and .70s. Therefore, at the job level of analysis, the convergence between task identity and variety was higher than at the individual level, but the convergence was lower for autonomy and feedback between the JCI and JDS.

The off-main diagonal correlations provided evidence of discriminant validity. The feedback scales on the JCI and JDS did not correlate highly (above .40) with other scales. The other scales had moderate to strong discriminant validity coefficients, varying from .34 (JDS task identity with JCI autonomy) to .73 (JDS autonomy with JCI task identity) with a median correlation of .60. Therefore, the JDS and JCI did not discriminate well with each other, except for feedback. These discriminant validity coefficients were substantially higher than the discriminant validity coefficients obtained in the Pierce and Dunham (1978a) study. Those values were in the low .30s and middle .40s.

### Summary

Overall, using jobs as the unit of analysis revealed several significant findings: (1) both the JCI and JDS were internally consistent across and within the scales; (2) the mean values for each job for these two measures were comparably influenced by random error; (3) there was high convergence between the task identity, variety and total scores on the JCI and JDS; and (4) there was limited

discriminant validity evidence for the JDS and JCI, except for the feedback scales.

The results obtained in this investigation were similar to the findings in a study examining the convergence between two measures of job satisfaction (Gillet & Schwab, 1975). The Job Descriptive Index and the Minnesota Satisfaction Questionnaire yielded high convergence for some scales and moderate convergence for others. Based upon those results, Gillet and Schwab (1975) recommended that future studies of satisfaction should employ multiple measures of satisfaction whenever possible, because different associations may be generated contingent upon the method used to assess job satisfaction. This recommendation can be generalized to other areas of interest, such as job design. Thus, it was important that the relationships between job design and job evaluation were examined separately, in this study, for the JCI and JDS to identify consistencies across the measures in relation to job worth components.

#### The Job Evaluation Measures

##### Reliability

The reliabilities of the FES and SOI job evaluation instruments were examined (Table 7). The internal consistency reliability coefficients were acceptable across raters and across the job families. These values ranged from .70 (rater 2 using the FES for p/s jobs) to .85 (SOI raters for clerical

jobs). Aggregating across raters within and across job families also revealed satisfactory levels of internal consistency. These values varied from .80 (p/s raters using the FES) to .91 (clerical raters using the SOI). In summary, the internal consistency reliability for these two instruments was acceptable.

The other estimate of reliability for these two job evaluation measures were inter-rater reliabilities. The zero-order correlations between raters within the FES or SOI yielded a wide range of results. The p/s raters using the SOI generated an inter-rater correlation of only .35, but the clerical raters using the SOI revealed a .81 correlation. The FES inter-rater reliabilities were much more consistent (.51 and .60) although low in magnitude. There appeared to be much more disagreement between the p/s raters (mean inter-rater reliability=.43) than the clerical raters (mean inter-rater reliability=.71). Due to the fact that the coefficient alphas were comparable between the p/s raters and the clerical raters, it is possible that the discrepancy between the inter-rater reliabilities across the two job families may be a result of the ambiguity in the p/s classification, rather than poor p/s raters. It is plausible that clerical jobs were more clearly defined than p/s jobs. The standard deviation for FES total for p/s jobs was 1090, while for clerical jobs the standard deviation was only 673. The standard deviation for



the SOI total for p/s jobs was 177, whereas the clerical jobs had a standard deviation of 118 on the SOI. Based upon the above mentioned standard deviations, it seems conceivable that the clerical job family was more homogenous and distinct than the p/s job family. Thus, higher inter-rater reliabilities for the clerical jobs would be logical.

There was only one other study that utilized the FES and the SOI on the same jobs (Collins & Muchinsky, 1990). Their estimates of inter-rater reliabilities were based on the formula advocated by Strahan (1980). This procedure is equivalent to the aggregate or effective reliability recommended by Rosenthal and Rosnow (1991). The effective reliabilities for the FES and SOI in this study ranged from .52 (the SOI for p/s jobs) to .89 (the SOI for clerical jobs). The Collins and Muchinsky (1990) study revealed inter-rater reliabilities for the FES and SOI predominately in the .90s (median inter-rater reliability = .98). These coefficients were substantially higher than those obtained in this study. The primary reasons for the differences was that in the Collins and Muchinsky (1990) study four raters per job family were used and the job families were more clearly defined. If four raters were used in this investigation, the effective reliabilities most likely would have been in the upper .80s and .90s for clerical jobs.

### Convergent and Discriminant Validity Evidence

Correlations within and across the job evaluation instruments were also computed. The intercorrelations within the FES (Table 8) indicated that skill and responsibility were basically one factor ( $r=.90$ ). Furthermore, these two factors almost exclusively comprised total job worth ( $r=.99$  and  $.95$  respectively). Effort and working conditions were distinct from each other and from the skill and responsibility components on the FES. Furthermore, effort and working conditions were relatively unrelated to total score on the FES ( $r=-.24$  and  $.29$ ). These findings indicated the total score on the FES job evaluation system was primarily based upon one factor: an integration of skill and responsibility.

Comparable results were obtained for the SOI (Table 9). Skill and responsibility on the SOI were very highly associated ( $r=.94$ ). Both of these factors were strongly related to total score on the SOI ( $r=.97$  and  $.99$  respectively). Moreover, the effort and working conditions components on the SOI were not related to each other ( $r=-.14$ ) or to the skill and responsibility factors. Effort and working conditions did not have strong associations with total score on the SOI as well ( $r=.35$  and  $.27$  respectively). Thus, total score on the SOI was based predominately on a job worth composite of skill and responsibility.

The intercorrelations obtained in this investigation were somewhat dissimilar to the intercorrelations in the Collins and Muchinsky (1990) study. They did find that skill and responsibility were highly associated for both the FES ( $r=.75$ ) and the SOI ( $r=.66$ ), but working conditions and effort were highly related in their study as well ( $r=.67$  on the FES;  $r=.75$  on the SOI). Therefore, the FES and SOI revealed two factors comprising job worth in their study: a composite of skill and responsibility and a composite of effort and working conditions. One possible explanation for these differences was that in the Collins and Muchinsky (1990) study three job families were investigated, only one of which (clerical) was included in this investigation. Differences across the job families may yield differences in the associations among the job evaluation factors within the FES and SOI.

The convergent validity evidence for the FES and SOI was strong for the skill, responsibility, working conditions and total scores (Table 10). All four indices were highly correlated across the FES and SOI. These values ranged from .69 (working conditions) to .96 (skill, total score). The effort scores on the FES were essentially unrelated to the effort scores on the SOI ( $r=-.12$ ). The most likely explanation for this low association between the effort scales was that the FES and SOI conceptualize effort differently. The FES had only one item pertaining to effort, which deals

with the physical demands of the job (e.g., lifting over 50 lbs.). The SOI had three items that were dealing with effort. One of the items investigated the physical demands of the job, which is comparable to the FES item. The other two effort items on the SOI were concerned with mental/visual strain and work place pressures/interruptions. Therefore, the SOI had a larger content domain to the effort component than does the SOI. It is plausible that physical demands of a job were unrelated to the mental/visual requirements and/or work place pressures of a job. It may depend upon which jobs are sampled.

The discriminant validity between the FES and SOI was adequate, except for high associations among the skill and responsibility components across the measures. The FES skill correlated .95 with the SOI responsibility component, while the SOI skill correlated .84 with the FES responsibility component. The other discriminant validity coefficients, however, were low in magnitude. These values ranged from -.26 (FES effort with SOI responsibility) to .41 (FES effort with SOI working conditions) with a median correlation of .23.

### Summary

Overall, there were several conclusions regarding the job evaluation instruments: (1) they had acceptable levels of internal consistency reliability; (2) there was limited inter-rater agreement, especially for the p/s jobs; (3) total scores

on both the FES and SOI were based primarily on skill and responsibility; (4) skill and responsibility across the two instruments showed high levels of convergent validity, but low levels of discriminant validity; (5) the effort scales revealed low levels of convergent validity, but acceptable discriminant validity; and (6) working conditions yielded moderately high levels of both convergent and discriminant validity. Ironically, working conditions is usually the least important job evaluation factor in nonmanufacturing jobs (Patten, 1988).

#### The Demographic Variables

For descriptive purposes correlations among various demographic variables were computed (Table 11). Typically, these demographic variables are interpreted at the individual level of analysis, but investigating these characteristics at the job level reveals some interesting findings. Jobs that had employees who have been with the organization a long time (high in organizational tenure) had a tendency to keep employees at that job (high in job tenure) for a considerable time period ( $r=.90$ ). Furthermore, jobs high in organizational tenure typically had older employees at that job ( $r=.66$ ) and higher salaries ( $r=.75$ ).

Jobs that had a tendency to have employees at that job a long time (job tenure) were also associated with older employees ( $r=.60$ ) and higher salaries ( $r=.74$ ). However, jobs

that were characterized by older employees did not necessarily have high salaries associated with them ( $r=.26$ ,  $p=.27$ ). The only strong association with the gender composition of the jobs was job pay ( $r=-.69$ ). Female-concentrated occupations generally received low wages in this organization across these two job families. The most plausible explanation for this finding was that the clerical jobs were predominately female (95% of the clerical employees) and they on average received \$11,000 less a year than p/s jobs. The p/s jobs were approximately 50% male and 50% female. Jobs that had employees with relatively high levels of academic achievement tended to have had high salaries ( $r=.58$ ,  $p<.01$ ). In summary, jobs that had the highest pay associated with them had a tendency to have employees that have been in the organization a long time and have been in the job a long time, relatively highly educated employees, and were not female-concentrated.

The job characteristic scales were correlated with the demographic variables (Table 12). The most important demographic variable in this study was job pay. Job pay was highly correlated with variety ( $r=.75$ ) and substantially with autonomy ( $r=.62$ ), task identity ( $r=.42$ ), and total job design ( $r=.65$ ). In general, the JDS scales with more highly related to salary than the JCI scales (median JDS  $r=.73$  v. median JCI  $r=.47$ ).

The high association between pay and total job design in this study was considerably higher than the Dunham (1977) investigation, which revealed an association of only .05. The only other study that examined the relationship between job pay and job design, in this framework, was conducted by Campion and Berger (1990). Their study reported a correlation between pay and job design, using the MJDQ, of .69, which was comparable to the finding in this study. The implications of this finding is discussed later in this section.

There were other strong associations between the job characteristics and the demographic variables. Autonomy was highly associated with organizational tenure ( $r=.64$ ) and job tenure ( $r=.66$ ). This finding implies that the longer employees have been with the organization and/or in the job, the more freedom they were permitted in performing job related tasks. Also, variety was strongly related to organizational tenure ( $r=.55$ ), job tenure ( $r=.54$ ), and education ( $r=.54$ ). This result suggests that job that involve multiple skills typically have employees with considerable experience in the organization & on the job, and highly educated employees. Lastly, feedback on the JCI was negatively correlated with education ( $r=-.62$ ). This outcome implies that jobs that have highly educated employees generally have less feedback from supervisors. All of these findings were intuitively logical.

The job evaluation measures were also correlated with the demographic variables (Table 13). Due to the position mandated by the Equal Pay Act of 1963 that salary of jobs should be founded upon the worth of jobs, it was not surprising that total scores on the job evaluation measures were very highly correlated with job pay ( $r=.90$ ). Furthermore, because skill and responsibility were highly associated with total score on the job evaluation instruments, it was expected that these two factors would also be highly related to salary ( $r=.89$  and  $r=.86$  respectively). Neither effort nor working conditions were significantly correlated with pay.

The other associations between the job evaluation components and the demographic variables were anticipated, because of the previously documented high associations among these factors (Tables 10 and 11). These correlations indicated that jobs high in skill, responsibility, and total worth typically had employees that had considerable organizational experience, job experience, education, and were not female-concentrated. Effort and working conditions had low and/or inconsistent findings with the demographic variables.

In summary, the demographic variables revealed two important findings for this study: (1) jobs that were highly paid across these two job families generally had high levels



of skill, responsibility, and total worth; and (2) jobs that were highly paid generally had high levels of autonomy, variety, and total job design. Additionally, organizational tenure and job tenure revealed consistent findings with pay across the job evaluation factors and the job characteristic inventories.

The Construct Redundancy between Job Evaluation and Job Design Across all Twenty Jobs

The JCI scales and total scores were correlated with the job evaluation components from both the FES and the SOI (Table 14). Autonomy on the JCI was moderately associated with skill ( $r=.30$ ), responsibility ( $r=.31$ ), and total job worth ( $r=.33$ ). These relationships suggested that jobs that permitted employees to act independently of others (supervisors/coworkers) had a tendency to be jobs that were worth more to the organization, and required more skills and responsibilities. It was expected, however, that the correlation between autonomy and responsibility would have been higher, because it would seem logical that jobs that had employees acting independently would have had their employees being totally responsible for their activities. It is conceivable that some jobs may have allowed freedom for independent action by its employees, but their tasks were not critical to the organization. Therefore, the employees in those jobs may have had certain freedoms to perform work

related functions and were accountable for their performance, but overall these tasks were limited in responsibility.

Comparable to the results obtained for autonomy, the task identity scale on the JCI had moderate associations with skill ( $r=.35$ ), responsibility ( $r=.31$ ), and total job worth ( $r=.34$ ). These relationships indicated that jobs that had employees that worked on projects from beginning to end were generally worth more to the organization, required more higher levels skills, and had relatively high levels of responsibility for its employees. It was anticipated that this set of correlations would have been stronger. If employees worked on projects from start to finish, most likely multiple skills would have been needed and the employees would have been responsible for the finished product. These modest associations suggested that maybe jobs that required employees to finish a project through to completion needed limited skills and outcomes that were not very crucial to the organization.

Variety on the JCI revealed the hypothesized outcomes with the job evaluation indices. Variety was strongly correlated with skill ( $r=.66$ ), responsibility ( $r=.62$ ), and total job worth ( $r=.66$ ). These relationships implied that jobs that required employees to perform a variety of tasks needed employees with many skills, and responsibilities. Since skill and responsibility were the main components in

total scores on the job evaluation measures, it was expected that total job worth would also be highly associated with variety. There was one other moderate association with variety: working conditions ( $r=.43$ ). This was an unanticipated finding that indicated that jobs that had employees performing a variety of tasks occasionally had employees working in unpleasant environments.

Feedback on the JCI was inversely related to the job evaluation components. The strongest associations with feedback were skill ( $r=-.41$ ), responsibility ( $r=-.37$ ), and total job worth ( $r=-.41$ ). This set of correlations indicated that jobs which provided employees with a considerable amount of feedback from supervisors, were characterized by lower levels of skill, responsibility, and total job worth. It is plausible that higher level skills and responsibilities were more abstract than lower level skills and responsibility. Thereby, feedback was less appropriate or applicable for jobs high in job worth.

Finally, total score on the JCI had medium effect sizes with skill ( $r=.33$ ), responsibility ( $r=.33$ ), and total job worth ( $r=.35$ ). Thus, there was a moderate tendency across the two families that jobs that were high in enrichment were also high in the levels of skill, responsibility, and total job worth. Nevertheless, only 12% of the variance in job evaluation was accounted for by total score on the JCI. The

implication of this finding is that job design, as assessed by the JCI, has limited relevance to the worth of jobs at this organization across these two job families.

The JDS scales were also correlated with the FES and SOI job evaluation components (Table 15). Substantial differences were found in the relationships between the JDS and JCI in relation to the job worth indices.

Autonomy of the JDS revealed the hypothesized associations with the job evaluation factors. This job characteristic was highly correlated with skill ( $r=.64$ ), responsibility ( $r=.66$ ), and total job worth ( $r=.67$ ). This set of correlations indicated that jobs that permitted employees the freedom to act independently had higher skills, more responsibilities, and in general were worth more to the organization. These values were considerably higher than those obtained with autonomy on the JCI. A plausible explanation for this discrepancy is that the JCI autonomy scale was subject to a substantial amount of error variance (Tables 2 and 3). Approximately half of the autonomy scores for the JCI had reliability coefficients below .70. Thus, it is likely that the unreliability in the JCI autonomy scale attenuated the true relationship between autonomy and job worth.

Task identity on the JDS also had higher associations with the job evaluation factors than did the task identity

scores on the JCI. Task identity on the JDS yielded the anticipated associations with skill ( $r=.56$ ), responsibility ( $r=.48$ ), and total job worth ( $r=.54$ ). These values were approximately .2 higher than the JCI task identity associations. The JDS values implied that jobs in which employees typically work on projects from start to finish utilized higher skills, had more responsibilities, and were worth more to the organization. The differences between the JCI and JDS on this corresponding scale is unclear. Both the JCI and JDS had levels of acceptable internal consistency reliability across the scale and within the scores, although the JCI scores were slightly larger in magnitude. Furthermore, scores on these two scales were highly correlated .81. The strength of the association (moderate or strong) between task identity and job evaluation appears to be a function of the method used and the variable, rather the variable alone.

Variety was the only job characteristic that revealed consistent findings across the JCI and JDS with the job evaluation components. The JDS variety scale was strongly related to skill ( $r=.72$ ), responsibility ( $r=.70$ ), and total job worth ( $r=.73$ ). Comparable values were obtained with variety on the JCI. These coefficients indicate that jobs that had employees performing numerous functions or work-related tasks utilized relatively high levels of skills, had

more responsibilities, and were higher in overall worth to the organization.

Feedback on the JDS had moderate correlations with three of the job evaluation factors. It was associated substantially with skill ( $r=.47$ ), responsibility ( $r=.46$ ), and total job worth ( $r=.46$ ). These coefficients were very different from the correlations between the JCI feedback scale and the job evaluation factors, but as previously mentioned, feedback on the two job characteristic inventories was conceptualized differently. The JDS feedback coefficients suggested that jobs that had tasks that provided immediate feedback were generally characterized by high levels of skill, responsibility, and total worth.

Lastly, total score on the JDS was correlated substantially with three job worth indices. It was associated highly with skill ( $r=.65$ ), responsibility ( $r=.65$ ), and total job worth ( $r=.67$ ). Thus, total score on the JDS accounted for 45% of the variance in job evaluation scores. This value was considerably higher than the value for JCI total (12%). Although JDS and JCI total score were strongly correlated ( $r=.82$ ) and both scales were high in internal consistency reliability, the variables that comprise the total scores on both measures are quite distinct. As previously discussed, feedback is completely different across the two inventories. The autonomy scales only correlated .45 ( $r^2=.20$ ) with other.

Furthermore, task significance was used to compute JDS total and dealing with others and friendship was used to calculate total score on the JCI. Only task identity and variety were comparable across the two inventories. Therefore, the differences between the two totals with job worth measures was plausible.

Summary There were numerous important results from the associations between the job design measures and the job evaluation instruments: (1) The JDS had much stronger associations with job worth indices than did the JCI; (2) Of the four scales in common to the JCI and JDS, variety was the only variable that was consistently and highly related to job worth factors; (3) Feedback from supervisors (JCI) had moderate inverse relationships with job worth, while feedback from the work itself (JDS) had moderate positive associations with job worth; (4) Autonomy was most reliably measured by the JDS and it yielded strong relationships with skill, responsibility, and total job worth; (5) mixed results were obtained for task identity, but the associations with job worth were between moderate to strong with job worth; and (6) the job characteristics do not appear to be related to the effort or working conditions components of job worth.

Past research As previously mentioned, other studies have examined the relationships between job worth and job characteristics. Dunham (1977) using the JDS computed a .40

correlation with total job evaluation score. Dunham (1977) did not examine the relationships among individual JDS scales and the job evaluation components.

Rousseau (1982) did find moderate correlations between 3 JDS scales with skills dealing with data and people (.28 to .52). Very low correlations were found between the JDS scales with skills dealing with things. Total score on the JDS was not calculated by Rousseau (1982).

Taber, Beehr, and Walsh (1985) revealed a .41 canonical correlation between job evaluation total and a job characteristic inventory that they created for their study (a combination of the Yale Job Inventory & the Michigan Organizational Assessment Package). Taber et al. (1985) did calculate correlations between the job characteristics with the job evaluation items. They did not, however, calculate scores on the four job evaluation components and an overall total score. Their scale had three job characteristics that were in common with this study: autonomy, task identity, and variety. The correlations between these characteristics and the particular job evaluation items ranged from -.11 (autonomy with physical effort) to .39 (variety with judgment & initiative).

Lastly, Campion and others (Campion & Berger, 1990; Campion & McClelland, 1991) used the MJDQ to investigate the relationships between job design and job worth. The MJDQ



motivational scale is comparable to total score on the JCI or JDS. There are not subscales on the motivational scale of the MJDQ. Therefore, total scores on this scale were associated with job evaluation measures. Campion and Berger (1990) obtained correlations of .52 and .29 between the motivational scale with the managerial and technical compensation scales. Campion and McClelland (1991) computed a .83 correlation between the motivational scale on the MJDQ and a total score on compensable factors.

Based upon past findings, this study has yielded higher associations between the JDS and job worth indices than previous research. Due to the fact that the JCI has never been examined in relation to job worth prior to this study, comparisons of JCI findings from this investigation with past research was not possible. The MJDQ motivational scale generated mixed results with job worth indices, ranging from moderate associations to a very strong relationship. At this point it is inconclusive to determine which job design measure is the most highly related to job worth. Furthermore, no other study has investigated the correlations between the specific job characteristics and the job evaluation components. Thus, these comparisons were also not possible.

#### Comparisons across the Job Families

The last group of analyses examined the relationships between the job characteristics and job evaluation components

within the job families (Tables 16 and 17). Autonomy on the JCI was moderately associated with working conditions ( $r=.45$ ) for p/s jobs. The only strong association with autonomy on the JDS for p/s jobs was with effort on the SOI ( $r=.53$ ). Autonomy on the JDS was not correlated substantially with effort on the FES for p/s jobs ( $r=.18$ ). Thus, there does not appear to be any consistent and substantial relationships between autonomy and job evaluation for p/s jobs.

Clerical jobs did have several significant relationships between autonomy and job evaluation components. Autonomy on the JCI correlated strongly with skill ( $r=.47$ ), responsibility ( $r=.44$ ), and total job worth ( $r=.47$ ). Autonomy on the JDS was highly associated with skill ( $r=.69$ ), responsibility ( $r=.63$ ), and total job worth ( $r=.69$ ). The differences between the coefficients for autonomy on the JCI and values for autonomy on the JDS most likely can be attributed to the limited reliability evidence of the autonomy scores on the JCI (Table 3). Overall, these findings indicated that autonomy was related to job worth components for clerical jobs, but this job characteristic was not considerably associated with job worth for p/s jobs.

Task identity on the JCI had three strong and negative associations with the job evaluation factors for p/s jobs. It was inversely correlated with skill ( $r=-.48$ ), responsibility ( $r=-.57$ ), and total job worth ( $r=-.54$ ). Task identity on the

JDS did have negative associations with these three job worth components, but none of them exceeded  $-.20$ . Therefore, the findings were inconclusive regarding the relationship between task identity and job worth, although the correlations hinted that p/s jobs that required employees to do a project from beginning to end were ranked lower in job worth relative to other p/s jobs. It appears that jobs that were staffed by specialists, employees that were responsible for one or two tasks, were the highest in job worth. The discrepancy in correlations between the JCI and JDS on this scale may be attributed to the moderate convergence between the scales within the p/s classification ( $r=.58$ ). It is plausible that these two scales were measuring slightly different constructs within this job family.

For clerical jobs there were consistent positive associations across the JCI and JDS task identity scales with job evaluation components. The JCI task identity scale correlated substantially with skill ( $r=.59$ ), responsibility ( $r=.55$ ), and total job worth ( $r=.60$ ). The JDS task identity scale correlated highly with skill ( $r=.63$ ), responsibility ( $r=.50$ ), and total job worth ( $r=.58$ ). Therefore, it seems that for clerical jobs that have employees working on tasks from start to finish, these jobs required or utilized higher skills, had more responsibilities, and in general were worth more within this job family. Almost exact opposite results

were obtained for the p/s jobs. For p/s jobs task identity appeared to be negatively associated with job worth.

Interestingly, the correspondence between the task identity scales was much higher within the clerical jobs ( $r=.81$ ) than within the p/s jobs ( $r=.58$ ).

Variety on the JCI had only two high correlations with job worth factors for p/s jobs. One of these associations was with effort on the FES ( $r=.75$ ), while the other was with working conditions on the SOI ( $r=.68$ ). The other coefficients between variety and the job evaluation factors were low to moderate in magnitude ( $.07$  to  $.43$ ). Variety on the JDS also had moderate associations with job evaluation factors ( $r=.34$  for skill to  $r=.54$  for working conditions). It seems that p/s jobs that were characterized by a variety of work-related tasks had a moderate to weak tendency to be worth more in relation to other p/s with less variety.

Clerical jobs demonstrated stronger associations between job worth and variety. The JCI variety scale was correlated highly with skill ( $r=.70$ ), responsibility ( $r=.64$ ), and total job worth ( $r=.66$ ). Comparably, the JDS variety scale was highly related to skill ( $r=.71$ ), responsibility ( $r=.63$ ), and job worth ( $r=.69$ ). It appears that the more variety clerical jobs had, the more they were worth in relation to other clerical jobs at this organization. Thus, variety was more relevant to job worth for clerical occupations than for p/s

occupations, although both families did have positive associations with this job characteristic.

The feedback scales displayed virtually opposite relationships with job worth for p/s jobs. The correlation between the JCI feedback scale and the JDS feedback scale was only .06. Feedback from your supervisor (JCI) yielded negative relationships with all of the job evaluation components. The only association, however, that was substantial was with effort ( $r = -.45$ ). These findings suggested that p/s jobs that had a considerable amount of supervisory feedback had a slight tendency to be lower in worth than other p/s jobs. Feedback from the job itself (JDS) revealed moderately positive associations with skill ( $r = .46$ ), responsibility ( $r = .62$ ), and total job worth ( $r = .52$ ). Thus, it seems that feedback had moderate associations with job worth measures, however, whether these relationships were positive or negative depends upon how feedback was defined or measured for p/s jobs.

Surprisingly, the feedback scales yielded comparable results for clerical jobs ( $r = .79$ ). Even though there was a strong correlation between the feedback scales for clerical jobs, there were not any strong associations between the feedback measures and the job evaluation factors. The correlations for feedback on the JCI varied from  $-.32$  to  $.28$ , while the coefficients for feedback on the JDS ranged from -

.39 to .28 for clerical jobs. Therefore, it appears that feedback, regardless of how it was defined, had negligible associations with job worth for clerical jobs, but it did have moderate relationships with p/s jobs. The direction of the associations for p/s jobs was contingent upon the definition of this job characteristic.

Total job design did not have any strong or consistent associations with job evaluation for p/s jobs. Total job enrichment on the JCI had two low and negative relationships with the job evaluation components and two low and positive correlations with the job worth factors. Overall, total score on the JCI was negatively associated with job worth ( $r = -.26$ ) for p/s jobs. Furthermore, JCI total score was also weakly related to pay for p/s jobs ( $r = .17$ ). Total score on the JDS had mixed and/or modest results with the job evaluation factors. Total job worth was also modestly associated with total job enrichment on the JDS ( $r = .24$ ). Additionally, total score on the JDS had a moderate association with pay for p/s jobs ( $r = .39$ ). Due to the fact that the magnitude of the relationships between total job enrichment and the job evaluation factors were in opposite directions and had high probabilities that these findings could have occurred by chance, it seems that for p/s jobs total job enrichment had negligible relevance to job worth and a limited association with pay.

Clerical jobs did reveal substantial relationships between job enrichment and job evaluation. Moreover, the results were consistent between the JCI and the JDS ( $r=.97$ ). Total score on the JCI correlated highly with skill ( $r=.64$ ), responsibility ( $r=.53$ ), and total job worth ( $r=.60$ ). Similarly, JDS total score was strongly associated with skill ( $r=.75$ ), responsibility ( $r=.62$ ), and total job worth ( $r=.70$ ). Therefore, it appears that total job enrichment accounted for between 36% to 49% of the variance in total job worth for clerical jobs. In addition, both JCI and JDS total score were highly related to pay for clerical jobs ( $r=.68$  and  $r=.75$  respectively). Thus, it seems that job design was pertinent to job worth and job pay for clerical jobs.

Summary The associations between job design and job evaluation across the two families revealed several significant findings. The most important finding was that total job enrichment was much less applicable to job worth and job pay for p/s jobs. Total job design did have substantial positive relationships with job worth indices for clerical jobs. Autonomy, variety and task identity all had strong associations with skill, responsibility, and total worth for clerical jobs. Variety was the only job characteristic that yielded consistent and moderate relationships with the job evaluation factors.

The critical question is: why were there considerable differences across the job families? The literature on the relationship between job design and job characteristics has not examined differences across job families. This is the first study to investigate this association across and within job families. Thus, possible explanations for the differences between the clerical and p/s jobs are based on knowledge of the jobs and intuition rather than theory and/or past empirical evidence.

It is plausible that clerical jobs are more concrete in terms of the tasks that must be performed and the worth of those tasks. For example, a clerical job in which employees were responsible for word processing, photocopying, and coordinating interdepartmental communications would be clearly worth more than a clerical job that has employees exclusively typing. Furthermore, the former job would apparently be higher in variety and autonomy than the latter job. For p/s jobs the association may not be as clear-cut. An assistant manager's job may have numerous responsibilities (e.g., coordinating work schedules, supervising and motivating employees, performance appraisals) and thus be high in variety, autonomy, and task identity, but it is not worth nearly as much to the organization as the job of an associate scientist, which has less variety and feedback. As indicated earlier, it is possible that the p/s classification is less



homogenous than the clerical family. Thus, making comparisons within a heterogenous job family is analogous to making comparisons across job families. Thereby, making the relationships between the job characteristics and job worth less distinct.

### Implications

Many of the findings from this study have important implications at both theoretical and applied levels. Theoretically, the findings of this investigation have revealed that psychology needs clearer definitions of our constructs in these areas. There was very little correspondence between the effort components of the job evaluation measures. Similarly, the feedback scales were relatively orthogonal between the JCI and JDS. Working conditions from the job evaluation measures and autonomy from the job design inventories had only moderate levels of convergence. Thus, there were many instances of instrument-specific bias. Different methods yielded contrary findings even though the instruments were purported to assess comparable dimensions. It will be difficult to ascertain the true relationships among the variables as long as the variables are defined and assessed differently.

Another major result from this investigation was that the JDS had higher associations with job worth and job pay than did the JCI. For almost every job characteristic in common to

the two design measures, the JDS had stronger relationships with the job evaluation factors than did the JCI. On many occasions the JDS coefficients were considerably higher than the JCI values. Therefore, there appears to be more convergence between the JDS and job worth than with the JCI and job worth. The literature on job design measures, however, has typically had a higher regard for the JCI over the JDS (c.f., Pierce & Dunham, 1978a; Taber & Taylor, 1990). An implication from this study is that the JDS would be the preferable measure of job enrichment for future studies on the relationships between job design and job worth.

Due to the fact that this is the first study examining the relationships between specific job characteristics and job evaluation, this investigation has provided a basis for future research exploring these specific associations. At this point it appears that skill variety was the most important job characteristics in relation to job worth and job pay across job families. Autonomy and task identity seemed to have medium to large associations with job worth and job pay. Furthermore, skill and responsibility were very highly interdependent and strongly associated with total job worth. Effort and working conditions seemed to have had little relevance to job worth and to the job characteristics.

Another important theoretical implication of this research is that there were substantial differences across the

two job families. Total job enrichment and individual job characteristics had little relevance to job worth indices for p/s jobs. For clerical jobs, variety, autonomy, task identity and total job enrichment all had strong associations with job worth. Therefore, it appears that the relationships between job design variables and job evaluation components were not consistent across job families. Theories on job enrichment seem to assume that differences among the relationships between the job characteristics and other outcomes are due to individual difference (e.g., growth need strength, social comparison) rather than due to differences across jobs or job families. Modifications or innovations to the theories of job design may be warranted.

The main implication of this study at the applied level deals with compensation and job redesign. Due to the large associations between job pay and total job enrichment ( $r=.56$  and  $r=.73$ ), it seems that jobs high in job design were also paid more than jobs low in job design. Although job pay should be based on job worth, as indicated by the Equal Pay Act of 1963, this study does show that job design was related to both pay and worth. However, because the relationships between job design and job evaluation were not consistent across job classifications, the impact of job enrichment needs to be assessed within each job family. Therefore, if a company redesigns or enlarges jobs within a classification,

the company should determine if the worth of these jobs has also increased. For this study it appears that high levels of autonomy, variety, and task identity for clerical jobs were strongly associated with job worth and job pay. For p/s jobs there were no substantial relationships between the job characteristics and the job evaluation components. This study was correlational and thus causality cannot be determined, but the magnitude of the associations justify a reevaluation of job worth after jobs have been enlarged or enriched. Therefore, the major implication, at the applied level from this investigation, is that job design may have a considerable impact on the worth and pay of some jobs.

This study posed the question: To what extent is there construct redundancy between job evaluation and job design? Complete redundancy implies that the two constructs are equivalent. If there was total redundancy between job evaluation and job design, then one could use job design measures to assess the worth of jobs or one could use job evaluation measures to determine levels of perceived job characteristics. In a study investigating the construct redundancy of job satisfaction and organizational climate, LaFollette and Sims (1975) indicated that support for the redundancy hypothesis requires consistent and strong associations among the variables. In this study there were considerable differences in the magnitude of the correlations

across job characteristics and job families. Furthermore, although many of the correlations between job design and job evaluation were very strong, a substantial amount (40%-50%) of the variance was not shared in common. Thus, the main implication of this study is that job evaluation and job design are not redundant. I/O psychology needs both constructs for a comprehensive understanding of jobs. Job design may influence the worth of jobs, especially for clerical jobs, but correlation does not prove causation.

#### Strengths and Weaknesses of the Present Study

This investigation had many advantages over previous research in the area of job design and job evaluation. To begin with this is the first study to examine the relationship between the JCI and job worth. The JCI is one of the most professionally established job characteristic inventories. Past research has relied on the JDS or the MJHQ to examine the associations between job design and job worth. In order for a comprehensive understanding of these relationships, the JCI needed to be examined in relation to job worth.

A second advantage of this study was that it was the only one to date that used more than one measure of either job design or job evaluation. All previous investigations have employed only one method of job characteristics and one job evaluation system. Multiple measures of both allowed for comparisons across the methods to find consistencies across

variables and results due to method biases. Comparisons across studies, which will undoubtedly lead to comparisons across measures and jobs, are more vulnerable to error.

Third, this is the first study to investigate the relationships between specific job characteristics with the four legally mandated job evaluation components. In order to have a complete understanding of the relationships between job design and job worth, the specific associations need to be established.

Fourth, the relationship between job design and job evaluation should be measured at the job level of analysis. This was only the third investigation that had jobs as the unit of analysis. The other two did not use the JDS or the JCI. Campion and Berger (1990) and Campion and McClelland (1991) used the MJDO. Thus, this was the first study to examine the associations between the JCI or JDS with job evaluation at the job level of analysis.

Lastly, this was the only investigation to examine job design and job worth within and across job families. This may be the most significant advantage of this research, because if a job is going to be enriched it most likely will still remain in its original job family. Therefore, it is plausible that the job's change in worth after redesigned will be relative to other jobs in that family rather than in comparison to all jobs within the organization. Future research on the

relationship between job design and job evaluation should examine these associations within and across job families.

The disadvantages or limitations of this study deal with sample size. The job evaluation ratings were based on two judges for each job family. The inter-rater reliabilities were low, especially for the p/s jobs. More job evaluators would have been desirable, especially for computing aggregate reliability. Unfortunately, it was very difficult to find even two individuals in this organization that were familiar with all ten jobs for either job family.

Second, the analyses for this study were either based on twenty observations, across all of the jobs, or ten observations, within the job families. These sample sizes seriously limited the power of the analyses. Furthermore, more advanced statistical procedures were not applicable with such a small number of observations. Also, to attain traditional levels of statistical significance for this investigation required very large effect sizes. Although statistical significance has its limitations it is widely accepted, as Campbell (1982) stated,

Books have been written to dissuade people from the notion that smaller *p* values mean more important results or that statistical significance has anything to do with substantive significance...Perhaps *p* values are like mosquitos. They have an evolutionary niche somewhere and

no amount of scratching, swatting, or spraying will dislodge them. (p. 698)

Thus, more jobs and more raters of the jobs would have improved the quality of this investigation.

#### Suggestions for Future Research

Future studies investigating the relationships between job design and job evaluation should continue to use multiple measures of both job design and job evaluation. They should also have jobs as the unit of analysis. Furthermore, they should evaluate these relationships within the context of job families and across the organization.

Due to the discrepancies found between clerical and p/s jobs, impending studies need to examine other job families to determine the extent to which other classifications have the worth of jobs influenced by job design. Also, comparisons between the MJJDQ and either the JDS or JCI need to be conducted in this realm to determine which instrument yields the most consistent and meaningful findings.

Lastly, field experiments are required to demonstrate causality between job design and job evaluation. All research to date examining this area has been correlational. Longitudinal causal analysis would be desirable to demonstrate the impact job design has on job worth. Unfortunately, opportunities for assessing the change in job worth after a



change in job design will be limited. Control groups will also be difficult to obtain.

#### Summary

This study addressed the question: To what extent is there convergence between job evaluation components which are associated with higher levels of pay and job design characteristics which are associated with higher levels of enrichment? Ten clerical jobs and ten professional/scientific jobs were the observational units for this investigation. Two professionally established job evaluation instruments and two widely accepted job characteristic inventories were used to assess levels of job worth and job design, respectively. Average salary was obtained for the twenty jobs.

Results indicated that there was moderate convergence between job evaluation and job design. The degree of convergence between job worth and job design was much higher for clerical jobs than for professional/scientific jobs. Also, the degree of convergence between job design and job evaluation was higher with the JDS than the JCI. Additionally, job pay was shown to be highly related to job design, especially in the clerical job family. Variety appeared to be the most highly related job characteristic with job worth indices including pay. Autonomy and task identity also revealed substantial relationships with job evaluation components. Feedback displayed considerable independence

across the job design measures and had limited correspondence to job evaluation factors. Skill and responsibility were highly related to each other and were the main components of total job worth. Effort and working conditions had modest relevance to both total job worth and with the job design variables.

These results had numerous implications. Theoretically, psychology needs to more clearly define its constructs in these areas and that individual differences should not be our focus in examining the relationship between job design and job worth. It is the nature of the jobs, within and across job families, that moderates the associations between job enrichment and job evaluation. Also, organizations should be alerted to the compensation implications of job redesign or enrichment, especially within certain job families. Lastly, due to the varying associations between job design and job evaluation across the job families, the two constructs do not appear to be redundant. Future research should replicate and extend this study to more jobs and other job families.

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Lastly, this dissertation is dedicated to my parents. Their love and support has made everything and anything possible. Thank you.

**APPENDIX A: JOB DIAGNOSTIC SURVEY**



5) To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing-- aside from any feedback co-workers or supervisors may provide? (Feedback)

**1-----2-----3-----4-----5-----6-----7**

**very little                  moderately                  very much**

**Please write a number in the blank for each statement as it applies to your job:**

1	2	3	4	5	6	7
very inaccurate	mostly inaccurate	slightly inaccurate	uncertain	slightly accurate	mostly accurate	very accurate

Var. 6) The job requires me to use a number of complex or high-level skills.

T.I. 7) The job is arranged so that I can do an entire piece of work from beginning to end.

**Feed. 8) Just doing the work required by the job provides many chances for me to figure out how well I am doing.**

**Var. 9) The job requires me to perform a variety of tasks.**

**T.S. 10) The job is one where a lot of people can be affected by how well the work gets done.**

**Aut. 11) The job gives me a chance to use my personal initiative and judgment in carrying out the work.**

T.I. 12) The job provides me a chance to completely finish the piece of work I began.

Feed. 13) After I finish a job, I know whether I performed well.

**Aut. 14) The job gives me considerable opportunity for independence and freedom in how I do the work.**

**T.S. 15) The job itself is very significant and important in the broader scheme of things.**

**APPENDIX B: JOB CHARACTERISTIC INVENTORY**



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**APPENDIX C:**  
**FACTOR EVALUATION SYSTEM PRIMARY STANDARD**

## FACTOR 1. KNOWLEDGE REQUIRED BY THE POSITION. (Circle one.)

Level 1. Knowledge of simple, routine, or repetitive tasks requiring little or no previous training or experience; OR skill to operate simple equipment.

Level 2. Knowledge of basic rules or procedures requiring previous training or experience; OR basic skill to operate equipment requiring some previous training.

Level 3. Knowledge of a body of rules or procedures requiring considerable training and experience to perform standard clerical assignments; OR training and experience to operate varied equipment.

Level 4. Knowledge of an extensive body of rules, procedures requiring training and experience to perform a wide variety of assignments; OR practical knowledge of standard procedures in a technical field requiring extended training or experience to perform work, interpret test results or extract information.

Level 5. Knowledge acquired through a bachelor's degree, or equivalent experience, training, and skill in applying this knowledge; OR in addition to practical knowledge of Level 4, practical knowledge of technical, specialized methods.

Level 6. Knowledge of the principles, concepts, and methods of a professional or administrative occupation supplemented by skill gained through job experience, or graduate study; OR practical knowledge of a wide range of technical methods, and skill in applying this knowledge to difficult projects.

Level 7. Knowledge of a wide range of concepts, principles, and practices in a professional or administrative occupation, such as that gained through extended graduate study or experience; OR a comprehensive, practical knowledge of a technical field, and skill in applying this knowledge to developing new methods.

Level 8. Mastery of a professional or administrative field to apply experimental theories or to make significant decisions or recommendations.

Level 9. Mastery of a professional field to generate and develop new hypotheses/theories.

## FACTOR 2. SUPERVISORY CONTROLS. (Circle one.)

Level 1. Supervisor makes specific assignments having clear, detailed instruction. Employee works as instructed, and consults with supervisor as needed. The work is closely controlled through the structure nature of the work or the circumstances in which it is performed, or through the review of the work.

Level 2. Supervisor provides general assignments indicating what is to be done, quality/quantity expected, deadlines, priorities; provides specific instructions for new, difficult, unusual assignments. Employee carries out assignments independently, but refers problems to supervisor. Supervisor checks finished work for accuracy and compliance.

Level 3. Supervisor makes assignments by defining objectives, priorities, deadlines; assists employee with unusual situations. Employee carries out work according to instructions, policies. Completed work is evaluated for technical soundness, requirements.

Level 4. Supervisor sets overall objectives. Employee and supervisor together develop deadlines, projects, work. Employee is responsible for planning and carrying out the assignment. Work is reviewed from an overall standpoint.

Level 5. Supervisor provides administrative direction. Employee has independent responsibility for carrying out work. Results are accepted without significant change.

## FACTOR 3. GUIDELINES. (Circle one.)

Level 1. Detailed work guidelines are provided. Employee must adhere to them strictly.

Level 2. Work procedures have been established; there are a number of specific guidelines. Employee makes judgment in locating and selecting appropriate guidelines for the situation.

Level 3. Guidelines are available, but do not completely apply to work. Employee uses judgment in adapting guidelines, and analyzes results.

Level 4. Work policies are stated in general terms. Guidelines are scarce. Employee uses initiative in developing methods, criteria, policies.

Level 5. Guidelines are broad, nonspecific. Employee uses judgment to interpret, develop guidelines.

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FACTOR 4. COMPLEXITY. (Circle one.)

Level 1. Tasks are clear-cut. No choice needs to be made in what is to be done. The work required is readily discernible and quickly mastered.

Level 2. The work has related steps, processes. Decision regarding what needs to be done involves various choices depending on a few different situations. Work performed differs in such things as kinds of transactions or entries, or sources of information.

Level 3. The work includes various duties with different processes. Decision regarding what needs to be done depends on analysis of the assignment which may involve many alternatives. Conditions and elements of the work must be analyzed to discern interrelationships.

Level 4. Work includes varied duties, unrelated processes, such as in an administrative or professional field. Decisions based on assessment of unusual circumstances, various approaches, incomplete/conflicting data. Work requires many decisions, interpreting data, planning work, refining methods.

Level 5. Work includes varied duties, unrelated processes applied to a broad range of activities or substantial depth of analysis, typically an administrative or professional field. Decisions made based on continually changing developments. Work requires originality in technique, criteria.

Level 6. Work consists of broad functions, processes of an administrative or professional field with concurrent or sequential phases being pursued. Decisions regarding what needs to be done include undefined issues, requiring extensive analysis of problems. The work requires continuing efforts to establish concepts, theories, or programs.

FACTOR 5. SCOPE AND EFFECT. (Circle one.)

Level 1. Work operations are specific, routine; include a few separate tasks. Work product/service is required to facilitate the work of others, but has little further impact.

Level 2. Work has specific rules, procedures; comprises a complete segment of an assignment. The work product/service affects the reliability, acceptability of further processes or services.

Level 3. Work involves using established criteria to treat conventional problems, situations. Work products/services affects the design or operations of systems, field investigations, testing operations, research conclusions, or the social, physical, economic well-being of persons.

Level 4. Work involves establishing criteria, formulating projects, assessing programs, analyzing conditions, problems. Work products/services affect a wide range of agency activities, or other agencies.

Level 5. Work involves isolating unknown conditions, resolving critical problems, developing new theories. Work product/service affects the work of other experts, programs or well-being of numerous people.

Level 6. Work involves planning, developing, carrying out vital administrative or scientific programs. Programs are essential to the agency or have long-term effects on large numbers of people.

FACTOR 6. PERSONAL CONTACTS. (Circle one.)

Level 1. Personal contacts are with employees within the immediate organization, or support units; AND/OR contacts are with general public in highly structure situations (example: ticket sales at an admission window).

Level 2. Contacts are with employees in same agency, but outside the immediate organization; people contacted generally have different functions AND/OR contacts are with general public in a moderately structured setting. (Examples: an airline reservation desk, or information center.)

Level 3. Contacts are with individuals outside the agency in a moderately unstructured setting. (Examples: contacts with attorneys, contractors; news media, public action groups, representatives of professional organizations.)

Level 4. Contacts are with high-ranking officials from outside the agency at national or international levels in highly unstructured settings. (Examples: presidents of national/international organizations, state governors, mayors.)

FACTOR 7. PURPOSE OF CONTACTS. (Circle one.)

Level 1. Purpose is to obtain, clarify, give factors or information. Facts/information may range from easily understood to highly technical.

Level 2. Purpose is to plan, coordinate, advise; to influence, motivate, individuals.

Level 3. Purpose is to influence, motivate, interrogate, or control individuals. Employee's approach must be skillful.

Level 4. Purpose is to justify, defend, negotiate, settle significant or controversial issues. Usually involves conferences, hearings of matters of considerable consequence.

FACTOR 8. PHYSICAL DEMANDS. (Circle one.)

Level 1. Work is sedentary. Employee typically sits; may be some walking, standing, bending, carrying of light items. No special physical demands.

Level 2. Work requires some physical exertion - long periods of bending; walking over rough surfaces, recurring bending, stooping, reaching or similar activities; moderate lifting. May require above-average agility and dexterity.

Level 3. Work requires considerable, strenuous physical exertion; lifting over 50 lbs., crouching/crawling in restricted areas, physical defense of self.

FACTOR 9. WORK ENVIRONMENT. (Circle one.)

Level 1. Involves everyday risks, discomforts which require normal safety precautions (such as in offices, libraries, residences, commercial vehicles); work area is adequately lighted, heated, ventilated.

Level 2. Involves moderate risks, discomforts which require special safety precautions (working around moving parts, carts, machines; with irritant chemicals, contagious persons); employee may be required to wear special protective equipment/garments.

Level 3. Involves high risks with exposure to potentially dangerous situations/stress; requires a range of safety and other precautions.

Factor Evaluation System Primary Standard  
Scoring System

<u>Compensable Job Factors</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>Level 6</u>	<u>7</u>	<u>8</u>	<u>9</u>
1. Knowledge	50	200	350	550	750	950	1250	1550	1850
2. Supervisory Controls	25	125	275	450	650				
3. Guidelines	25	125	275	450	650				
4. Complexity	25	75	150	225	325	450			
5. Scope and Effect	25	75	150	225	325	450			
6. Personal Contacts	10	25	80	110					
7. Purpose of Contacts	20	50	120	220					
8. Physical Demands	5	20	50						
9. Work Environment	5	20	50						



**APPENDIX D:**  
**STATE OF IOWA JOB EVALUATION SYSTEM**

1. KNOWLEDGE-FROM FORMAL TRAINING/EDUCATION. (Circle one.)

1st Degree. Requires enough basic education to understand and follow standard routine practices or oral instructions. No special previous training, knowledge, skill required.

2nd Degree. Requires ability to read, write, follow detailed written/oral instructions, use simple arithmetic processes (add, subtract, multiply, divide whole numbers).

3rd Degree. Requires ability to add, subtract, multiply, divide decimals/fractions; ability to prepare routine correspondence, records, reports; may require basic knowledge of typing, bookkeeping, drafting, blueprint reading, etc.

4th Degree. Requires knowledge of standard procedures in a technical field requiring extended training; business, medical, legal technology; stenography or accounting or laboratory procedures; ability to operate equipment/instruments requiring more than 6 mo. training to obtain proficiency; ability to interpret manuals, present information/ideas.

5th Degree. Requires ability/knowledge of a specialized technical field such as accounting, data processing, laboratory procedures, office management, statistics, advanced math, drafting, etc.; operate precision tools and interpret results; compile statistics, interpret reports; also practical knowledge of procedures in a skilled trade/maintenance field such as masonry/plumbing. Equivalent to broad specialized training that is directly related to type of work being performed or completion of full apprenticeship of four or more years in a recognized trade or craft.

6th Degree. Require broad knowledge of basic theories/principles, concepts, methods of professional/specialized technical field; analyze and carry out wide range of assignments.

7th Degree. Requires advanced training beyond the 6th Degree in operations more complex; ability to apply principle of logical/scientific thinking with respect to abstract or more diverse variables.

8th Degree. Required training beyond 7th Degree; mastery of all advanced principles, concepts, theories, methods in a professional/administrative field. Ability to apply principles of logical/scientific thinking to a wide range of intellectual/highly abstract classes of concepts.

**2. KNOWLEDGE-FROM EXPERIENCE. (Circle one.)**

1st Degree. Position requires no previous experience/less than 1 mo. on-the-job training. No special knowledge is required.

2nd Degree. Position requires limited knowledge of simple work procedures. Some basic knowledge of rules, procedures. Prior experience could be acquired within 3-6 mo. On-the-job learning time could range from 1-3 mo.

3rd Degree. Position requires moderate knowledge of technical procedures or work activities. Prior experience could be acquired in 6-12 mo. Requires job learning time of 3-6 mo.

4th Degree. Position requires considerable knowledge of multiple technical/work procedures to perform wide variety of assignments; may need to teach basic procedures to others; prior experience could be learned in 12-36 mo. Requires job learning time of 6-12 mo.

5th Degree. Position requires extensive knowledge of complicated technical/specialized areas, supervisory ability. Prior experience can be learned in 3-5 yr. Job learning time exceeds 1 yr.

6th Degree. Position requires comprehensive understanding of complex techniques/procedures to be used in development of new methods, approaches. Prior experience is beyond 5 yr. Job learning time exceeds 1 yr.

**3. JOB COMPLEXITY, JUDGMENT, PROBLEM-SOLVING. (Circle one.)**

1st Degree. Work is routine, structured, repetitive, limited no. of simple procedures, little thought/decision making, tasks are clear cut, data are simple, few.

2nd Degree. Work is structured with sequential steps, employee makes minor decisions involving various choices of what needs to be done such as transactions, entries, type of materials.

3rd Degree. Work is standardized but involves wider range of tasks, steps; decisions are made in response to changing conditions; decisions may affect quality, accuracy, or utility of results; needs creativeness; requires judgment to apply procedures.

4th Degree. Work is diversified/moderately difficult, requires judgment to meet problems and situations to which their application is not clearly defined, has assigned objectives, ability to modify methods, plan, perform operations, make decisions depending on conditions, phase, issues involved; needs ingenuity/imagination.

5th Degree. Work is difficult/complex, broad objectives, frequently changing conditions/problems, considerable judgment, policies may not be clearly defined, considerable ingenuity/initiative, substantial analysis/assessment in decision making.

6th Degree. Work requires substantial depth of analysis, originating new techniques, establishing criteria, developing new information, decisions in areas of uncertainty of approach, deal with complex factors, considerable judgment, creative/imaginative/original required on a daily basis.

7th Degree. Work involves broad functions/processes, several phases being pursued concurrently/sequentially with support of others within/outside of organization; formulate/implement policies for major divisions/functions; performs research, planning; high degree of judgment, initiative, ingenuity; establish concepts, theories, programs.

#### 4. GUIDELINES/SUPERVISION AVAILABLE. (Circle one.)

1st Degree. Specific, detailed guidelines are provided to employee, is supervised, tasks required and results are specified with frequent review, employee has limited authority, adheres to guidelines, work is controlled by nature of the work, circumstances in which it is performed, or supervisory review.

2nd Degree. Established work procedures/guidelines available, supervisor provides continuing assignment, employee selects most appropriate guidelines/makes minor deviations, may decide among alternatives, supervisor approves/screens work, review of work increases with more difficult assignments, employee receives general instructions, defers to supervisor for unfamiliar situations, work is subject to close check.

3rd Degree. Employee uses judgment in interpreting/adapting guidelines, has specific objectives, receives general supervision, plans/arranges own work, systematic supervisory checks, has assistance for unusual problems, employee carries out successive steps, handles problems/deviations, work is evaluated for technical soundness, etc., methods used are not reviewed in detail.

4th Degree. General policies. Guidelines are scarce or limited, employee deviates from methods/trends/patterns to develop new methods, criteria, new policies, requires only direction, supervisor set objectives, employee and supervisor work in consultation, independence of action is stressed, work is reviewed through results, employee keeps supervisor informed of progress, work is periodically checked for progress.

5th Degree. Employee may be recognized as a technical authority in developing and interpreting guidelines, position requires administrative direction and has direct responsibility for final results, employee plans, designs, carries out programs, projects, studies, etc. independently, supervision is through staff conferences, results of work normally accepted without change. Recommendations for new projects and alteration of objectives are usually evaluated for such consideration as availability of funds and other resources, broad program goals or priorities.

5. PERSONAL CONTACTS. (Circle one.)

1. Contacts with others require providing simple responses to requests for information or giving routine directions. Information is easily understood.

2. Purpose of contact is to give, receive, or screen factual information. Normal communication skills required, structured relationship.

3. Purpose is to explain/interpret guidelines/instructions, requires well-developed communication skills, courtesy, discretion, contacts are nonroutine/nonstructured, not highly sensitive, may give advice, guidance, counsel.

4. Purpose is to exchange/disseminate important information requiring careful negotiation of policies, may make formal presentations, interview; must be discrete, accurate, clear in communication, may influence, motivate, convince, change views.

5. Purpose is to solve problems through discussion/persuasion; must exercise tact, discretion, judgment; be diplomatic, skillful in dealing with others.

5A. TYPE OF CONTACT. (Circle one.)

1. Contacts are with others in same dept./unit, related units.

2. Occasional contact with employees in other depts./locations having different functions, may have few contacts during the month with persons outside the organization or with residents/clients in institutions.

3. Occasional (less than once/day) contacts with persons outside organization, with residents/clients in institutions, and/or frequent contacts at Level B.

4. Frequent contacts (once/day or more) with persons outside organization.

## 6. PHYSICAL DEMANDS. (Circle one.)

1st Degree. Work is sedentary, employee is normally seated, work may require sitting, standing, walking at will, may be some light tasks requiring a minimum of tiring, physical effort such as bending, carrying light items such as papers, books, small parts, driving an auto, etc. No special agility/dexterity demands are required.

2nd Degree. Light physical effort working with materials/supplies weighing less than 25 lbs, occasional operation of machines/equipment resulting in some fatigue, considerable walking or standing or confinement to one area.

3rd Degree. Work requires moderate physical exertion, long periods of standing, walking over rough surfaces, periodic bending, crouching, stooping, stretching, reaching, prolonged repetitive motion of certain body parts, periodic lifting up to 50 lbs, frequent lifting of light weight, operation of heavy equipment (such as bulldozers).

4th Degree. Sustained physical effort working with average weight materials/supplies up to 50 lbs, often involving walking, carrying, climbing, difficult work positions for sustained periods, continuous operation of machines/equipment, moderate degrees of strength, stamina, agility, may be required to lift objects over 50 lbs.

## 7. MENTAL/VISUAL DEMAND. (Circle one.)

1st Degree. Normal mental and/or visual attention in connection with the standard flow of partially repetitious work where continuity is only occasionally interrupted, may require specific degrees of agility/dexterity, occasional (up to 10% daily) intense concentration and/or resulting in visual strain requiring attention to detail, such as typing at average speed, hand lettering, math computations, reading/proofing, adjusting machines, monitoring residents/clients, tasks involve eye/mind coordination such as in testing, checking, inspecting.

2nd Degree. Frequent mental and/or visual attention where work is repetitive, occasionally tedious, requires alertness, concentration. Recurring up to 30% daily, requiring an intense level of concentration and/or resulting in visual strain as in 2nd Degree.

3rd Degree. Concentrated mental/visual attention on repetitive operations for sustained periods, may require high degree of agility/dexterity, 30-60% of daily work requires intense concentration and/or resulting in visual strain as in 2nd Degree; work typical of this level includes adjusting/repairing precision instruments, court reporting on a machine, preparing freehand artwork, etc.

4th Degree. Intense/exacting mental/visual attention, involving performance of complex operations, or constant repetition of tedious work, extremely mentally fatiguing work involving a great deal of strain on the senses, over 60% of the daily work requires an intense level of concentration and/or resulting visual strain as in 2nd Degree.

9. SCOPE AND EFFECT. (Circle one.)

1st Degree. Work product/product/service facilitates work of others; has little impact beyond immediate organizational unit.

2nd Degree. Output/product/service indirectly affects organizational goals; affects accuracy, reliability, acceptability of further processes/services; has a direct relationship to other work within the organization.

3rd Degree. Output/product/service affects immediate/ongoing goals; affects operations, services, individuals or activities, but does not materially affect long range direction/planning/control of programs or the adequacy of activities or the social/physical/economic well-being of persons.

4th Degree. Output/product/service has significant impact on administrative developments, responsibilities of this position may be shared or direct, results of work have short- and long-term influence, affects wide range of agency activities, industrial activities, or operation of other agencies.

5th Degree. Output/product/service has controlling impact on all aspects/phases of major program administration, decisions influence image/success/future of the program(s), have major long-term impact, affects the work of other experts, development of major programs, allocation/conservation of significant resources or the well-being of substantial numbers of people.

10. IMPACT OF ERRORS. (Circle one.)

1st Degree. Errors are easily noticeable, readily detected, result only in minor confusion, usually due to carelessness, cost to correct is minimal.

2nd Degree. Errors are usually detected in succeeding operations, generally within a single department or phase of operations, consequences may affect the work of others but is not serious, involves expenditure of time to trace/correct.

3rd Degree. Errors may be serious. Consequences may result in poor product quality, confusion, money loss, annoyance, usually detected before final results become serious, usually confined to organization, but could affect other staff, clients, public; work is in areas where ordinary care is required to protect safety/welfare of others/harms to others such as burns, cuts, bruises, etc. could occur.

4th Degree. Errors may result in losses of materials, minor equipment, working time, goodwill; errors difficult to detect but become apparent through adverse impact on subsequent operations/events. Errors result largely from poor judgment; judgments may adversely affect relationships outside the organization, progress of clients, discomfort to patients, delay of treatment, inconvenience to public; work is performed where special care is required to protect safety/welfare of others; results could be incapacitating injuries to others/even death. Consequences of individual carelessness is serious.

5th Degree. Errors have serious effects on long-term health/well-being of an individual, significant disruption of operation/services, delays in projects; errors are not subject to supervisory review, may result in severe injuries to patients, permanent injury or loss of life; extreme care and high degree of judgment is necessary to protect safety/welfare of others; work requires constant attention/alertness; consequences of individual carelessness are extremely serious.

#### 11. WORKING ENVIRONMENT. (Circle one.)

1st Degree. Work environment is virtually without unpleasant conditions, e.g., standard office area with adequate light, heat, usual noise of office equipment.

2nd Degree. Fairly good working conditions. Occasional disagreeable elements or daily exposure to one element which is noticeably disagreeable. May occasionally work outside, or alone.

3rd Degree. Somewhat disagreeable working conditions due to periodic exposure to several disagreeable elements or continuous exposure to elements which are particularly disagreeable (e.g., considerable noise of machines, or work performed in isolation).

4th Degree. Disagreeable working conditions involving regular continuous exposure to several extremely disagreeable elements.

#### 12. UNAVOIDABLE HAZARDS/RISKS. (Circle one.)

1st Degree. Work environment involves risks which require normal safety precautions such as offices. Bodily injury would be small (cuts/bruises).



2nd Degree. Work involves moderate risks, requires special safety precautions, such as working around movable parts/with chemicals; employees need protective gear or clothing, bodily injury would be moderate (seeking medical attention), but health is not seriously affected and there would be no significant loss of work time.

3rd Degree. Work involves regular risk, requires special safety precautions, injury may be serious/permanent, may be exposed to diseases, health may be temporarily affected.

4th Degree. Work involves occasional risk to life-threatening situations, requires range of safety precautions, hazardous work, chance of permanent bodily injury or loss of life, as working at great heights, subject to physical attack, riots, explosive materials, equipment, exposure to contaminated materials.

5th Degree. Work involves daily risk with exposure to life threatening situations, such as in a maximum security environment or contact with dangerous materials or equipment; highly hazardous work, great chance of permanent serious injury/loss of life.

### 13. WORK PACE/PRESSURES. (Circle one.)

1st Degree. Work seldom varies in scheduling, priorities, volume, assignments are day-to-day, employee knows nature/schedule of work for weeks/months ahead.

2nd Degree. Changes in volume/priorities are gradual/anticipated (budgets, seasonal), few deadlines but have lead time, 1-2 projects have priority at a time, employee can anticipate nature of work/activities weeks to months ahead, 2-3 times mo. on an average employee receives projects which exert unusual pressure to complete.

3rd Degree. Volume or priorities change frequently/short notice, numerous deadlines with little lead time, time pressures due to rush orders, emergencies, etc., several priority projects at one time, cannot anticipate work more than a day ahead.

### 13A. INTERRUPTIONS. (Circle one.)

A. No distractions/interruptions.

B. Infrequent distractions/interruptions, little impact on employee's work activities.

C. Daily distractions/interruptions, impede work progress.

## State of Iowa Job Evaluation System Point Structure

<u>Factor</u>	<u>Degree</u>							
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
1. Knowledge-experience	6	10	17	29	46	77	129	150
2. Knowledge-experience	8	13	22	36	60	100		
3. Complexity Judgment- Problem Solving	6	10	16	26	43	72	120	
4. Guideline/Supervisor	6	11	18	30	50			
5. Personal Contacts								
1)		<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>			
2)		17	22	28	36			
3)		22	28	36	47			
4)		28	36	47	60			
5)		36	47	60	78			
		47	60	78	100			
6. Physical Demands	11	18	30	50				
7. Mental Visual	11	18	30	50				
9. Scope and Effect	13	22	36	60	100			
10. Impact of Errors	6	11	18	30	50			
11. Work Environment	11	18	30	50				
12. Hazards-Risks	6	11	18	30	50			
13. Pace/Interruptions								
1)		<u>A</u>	<u>B</u>	<u>C</u>				
2)		18	23	30				
3)		23	30	39				
		30	39	50				